THE PORT AUTHORITY OF NY & NJ

Karen E. Eastman
Secretary

February 25, 2016

Mr. Paul Berger
The Record
1 Garret Mountain Plaza
Woodland Park, NJ 07104

Re: Freedom of Information Reference No. 16556

Dear Mr. Berger:

Please accept this letter as a response by The Port Authority of New York & New Jersey ("Port Authority") to your records request of December 18, 2015. We enclose 867 pages of responsive documents. An index describing all documents that are redacted or being withheld from disclosure pursuant to recognized Open Public Records Act ("OPRA") exemptions for advisory, consultative or deliberative material, attorney-client privilege, personnel records, and other legal authority, will be provided to your attorney, Samuel Samaro, for review.

The December 18, 2015 Request

1. Emails from 2/20/13 to 2/28/13 by, to and among David Samson and Ann Klein. For purposes of this request, please limit your search only to emails that contain the term "Port Authority Finances."

Port Authority Response: The Port Authority is producing 67 pages of documents (3 separate documents) responsive to this request. An index describing any documents that are redacted or being withheld from disclosure pursuant to a recognized OPRA exemption or other legal authority will be provided to your attorney for review.

2. Emails from 9/4/13 to 9/10/13 by or to James E. McCoy [search terms limited to emails that contain any of the following terms: traffic, bond, PA, port authority, matter, lee, mayor, GWB, George Washington Bridge or study].

Port Authority Response: The Port Authority is producing 52 pages of documents (28 separate documents) responsive to this request. An index describing any documents that are redacted or being withheld from disclosure pursuant to a recognized OPRA exemption or other legal authority will be provided to your attorney for review.

4 World Trade Center, 23rd Floor
150 Greenwich Street
New York, NY 10007
T: 212 435 6528 F: 212 435 6604

3. Emails from 9/4/13 to 12/20/13 by, to, and among David Garten and Scott Rechler. Please limit your search only to emails that contain any of the following terms: "2nd Floor," "traffic study," and/or "red flag."

Port Authority Response: The Port Authority is producing 748 pages of documents (143 separate documents) responsive to this request. An index describing any documents that are redacted or being withheld from disclosure pursuant to a recognized OPRA exemption or other legal authority will be provided to your attorney for review.

Please refer to Reference No. 16556 in any future correspondence.

Sincerely,

Karen E. Eastman
Secretary

Enclosures

CC: Samuel J. Samaro, Esq.

Klein, Ann AAA litigation/F

From: Samson, David

Sent: Tuesday, February 26, 2013 6:52 PM

To: Klein, Ann

Subject: Fwd: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances

Chairman Samson

Begin forwarded message:

> **From:** "Buchbinder, Darrell" <dbuchbin@panynj.gov>
> **Date:** February 26, 2013 5:50:43 PM EST
> **To:** "Samson, David" "Rechler, Scott " >, "Rubin, James" , "Sartor, Anthony" >, "Steiner, David"
>
> **Cc:** "Bagger, Richard" < "Holmes III, H. Sidney" >, "Lynford, Jeffrey" >, "Moerdler, Jeffrey" < >, "Pocino, Raymond" >, " Rosado, Rossana" < "Schuber, William" >, "Foye, Patrick" <pfoye@panynj.gov>, "Baroni, Bill" <bbaroni@panynj.gov>, "Eastman, Karen" <keastman@panynj.gov>, "Kwon, Phillip" <pkwon@panynj.gov>, "Lee, Megan" <mlee@panynj.gov>, "Ma, John" <jhma@panynj.gov>, "McIntyre, Carlene" <cmcintyr@panynj.gov>, "O'Reilly, Patrick" <poreilly@panynj.gov>, "Wildstein, David" <dwildstein@panynj.gov>, "Southwell, Alex" <asouthwell@gibsondunn.com>, "Hart, Nancy" <NHart@gibsondunn.com>
> **Subject: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances**

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Darrell Buchbinder
General Counsel
The Port Authority of New York and New Jersey
225 Park Avenue South, 15th Floor
New York, NY 10003
(212) 435-3515

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From: Samson, David
Sent: Tuesday, February 26, 2013 6:52 PM
To: Klein, Ann
Subject: Fwd: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances

Chairman Samson

Begin forwarded message:

> **From:** "Buchbinder, Darrell" <dbuchbin@panynj.gov>
> **Date:** February 26, 2013 5:50:43 PM EST
> **To:** "Samson, David" , "Rechler, Scott " , "Rubin, James" , "Sartor, Anthony" , "Steiner, David"
> **Cc:** "Bagger, Richard" , "Holmes III, H. Sidney" , "Lynford, Jeffrey" , "Moerdler, Jeffrey" , "Pocino, Raymond" , " Rosado, Rossana" , "Schuber, William" < , "Foye, Patrick" <pfoye@panynj.gov>, "Baroni, Bill" <bbaroni@panynj.gov>, "Eastman, Karen" <keastman@panynj.gov>, "Kwon, Phillip" <pkwon@panynj.gov>, "Lee, Megan" <mlee@panynj.gov>, "Ma, John" <jhma@panynj.gov>, "McIntyre, Carlene" <cmcintyr@panynj.gov>, "O'Reilly, Patrick" <poreilly@panynj.gov>, "Wildstein, David" <dwildstein@panynj.gov>, "Southwell, Alex" <asouthwell@gibsondunn.com>, "Hart, Nancy" <NHart@gibsondunn.com>
> **Subject: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances**

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Redacted

Darrell Buchbinder

General Counsel
The Port Authority of New York and New Jersey
225 Park Avenue South, 15th Floor
New York, NY 10003
(212) 435-3515

Redacted

From: Samson, David
Sent: Thursday, February 28, 2013 11:18 PM
To: Klein, Ann
Subject: Fwd: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances
Attachments: Redacted

Chairman Samson

Begin forwarded message:

> **From:** "Buchbinder, Darrell" <dbuchbin@panynj.gov>
> **Date:** February 28, 2013 7:40:52 PM EST
> **To:** "Samson, David" <dsamson@wolffsamson.com>, "Rechler, Scott" , "Rubin, James" , "Sartor, Anthony" , "Steiner, David"
> **Cc:** "Bagger, Richard" , "Holmes III, H. Sidney" , "Lynford, Jeffrey" , "Moerdler, Jeffrey" "Pocino, Raymond" , " Rosado, Rossana" , "Schuber, William" , "Foye, Patrick" <pfoye@panynj.gov>, "Baroni, Bill" <bbaroni@panynj.gov>, "Eastman, Karen" <keastman@panynj.gov>, "Kwon, Phillip" <pkwon@panynj.gov>, "Lee, Megan" <mlee@panynj.gov>, "Ma, John" <jhma@panynj.gov>, "McIntyre, Carlene" <cmcintyr@panynj.gov>, "O'Reilly, Patrick" <poreilly@panynj.gov>, "Wildstein, David" <dwildstein@panynj.gov>, "Southwell, Alex" <asouthwell@gibsondunn.com>, "Hart, Nancy" <NHart@gibsondunn.com>
> **Subject: RE: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances**

<u>PRIVILEGED & CONFIDENTIAL</u>

Redacted

Darrell Buchbinder
General Counsel
The Port Authority of New York and New Jersey
225 Park Avenue South, 15th Floor
New York, NY 10003
(212) 435-3515

To ensure compliance with Treasury Department regulations, please be advised that, unless otherwise expressly indicated, any federal tax advice contained in this message (together with any attachments) is not intended or written to be used, and cannot be used, for the purpose of (i) avoiding tax-related penalties under the Internal Revenue Code or applicable state or local tax law provisions or (ii) promoting, marketing or recommending to another party any tax-related matters.

This e-mail (together with any attachments) is intended only for the use of the named addressee(s) and may contain legally privileged and/or confidential information; please notify me immediately if you received this e-mail in error. Any unauthorized use, dissemination, distribution or copying of this e-mail (or any attachments) is strictly prohibited.

From: Buchbinder, Darrell
Sent: Tuesday, February 26, 2013 5:51 PM
To: Samson, David; Rechler, Scott ; Rubin, James; Sartor, Anthony; Steiner, David
Cc: Bagger, Richard; Holmes III, H. Sidney; Lynford, Jeffrey; Moerdler, Jeffrey; Pocino, Raymond; Rosado, Rossana; Schuber, William; Foye, Patrick; Baroni, Bill; Eastman, Karen; Kwon, Phillip; Lee, Megan; Ma, John; McIntyre, Carlene; O'Reilly, Patrick; Wildstein, David; Southwell, Alex; Hart, Nancy
Subject: New Jersey Assembly Transportation, Public Works and Independent Authorities Committee Investigation - Port Authority Finances

PRIVILEGED & CONFIDENTIAL

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Darrell Buchbinder
General Counsel
The Port Authority of New York and New Jersey
225 Park Avenue South, 15th Floor
New York, NY 10003
(212) 435-3515

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From: Eastman, Karen
To: Handel, Linda; McCoy, James
Sent: 9/9/2013 11:00:41 AM
Subject: FW: HT General Cleaning Service Contract - Contract Justification and Cost-Benefit
Attachments: HT General Cleaning 2013 Service Contract Justification Form_general cleaning.xlsx; HT General Cleaning Cost-Benefit Sheet.xlsx

FYI

From: Luna, Juan
Sent: Friday, August 30, 2013 10:44 AM
To: McCarthy, Libby
Cc: Eastman, Karen; Persaud, Annie
Subject: HT General Cleaning Service Contract - Contract Justification and Cost-Benefit

Libby,

Redacted

Juan Luna
Sr. Financial Analyst
The Port Authority of New York and New Jersey
Management and Budget Department
233 Park Ave S - 12th Floor
New York, NY 10003
Phone: (212) 435-5988
Fax: (212) 435-5225

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From:	Eastman, Karen
To:	Handel, Linda; McCoy, James
Sent:	9/9/2013 11:00:41 AM
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To: McCarthy, Libby
Cc: Eastman, Karen; Persaud, Annie
Subject: HT General Cleaning Service Contract - Contract Justification and Cost-Benefit

Libby,

Redacted

Juan Luna
Sr. Financial Analyst
The Port Authority of New York and New Jersey
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Phone: (212) 435-5988
Fax: (212) 435-5225

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From: McCoy, James
To: Eastman, Karen
Sent: 9/4/2013 8:16:37 AM
Subject: Re: September Highlights

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From: Eastman, Karen
Sent: Wednesday, September 04, 2013 07:58 AM
To: McCoy, James; Handel, Linda
Subject: RE: September Highlights

Redacted

From: McCoy, James
Sent: Wednesday, September 04, 2013 7:42 AM
To: Eastman, Karen; Handel, Linda
Subject: September Highlights

For review. Thanks.

From: Eastman, Karen
To: McCoy, James; Handel, Linda
Sent: 9/10/2013 10:49:38 AM
Subject: Domestic Steel and Jobs--September 2013 ED Report
Attachments: ED Report Sept 2013DomesticSteelandJobs.docx

From: Foye, Patrick
Sent: Monday, September 09, 2013 10:04 AM
To: 'Samson, David'; 'Scott H. Rechler 'bpaterson 'David Steiner'; 'jlynford 'Moerdler, Jeffrey'; 'Ken.lipper 'rpocino ; 'rbagger 'rossana.rosadc Sartor, Anthony'; 'wpschuber
Cc: Baroni, Bill; Ma, John; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe; Wildstein, David
Subject: Domestic Steel and Jobs--September 2013 ED Report

Commissioners-- attached is the September 2013 ED Report Redacted
Redacted

I look forward to discussing this important issue next week.

Pat

To: All Commissioners
From: Patrick J. Foye
Date: September 9, 2013
Cc: B. Baroni, D. Buchbinder, P. Danielides, D. Garten, J. Ma, D. Wildstein, K. Eastman
Re: Domestic Steel and Jobs--September 2013 Executive Director's Report

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I look forward to discussing this further at our upcoming Board meeting.

From: Eastman, Karen
To: McCoy, James; Handel, Linda
Sent: 9/10/2013 10:49:38 AM
Subject: Domestic Steel and Jobs--September 2013 ED Report
Attachments: ED Report Sept 2013DomesticSteelandJobs.docx

From: Foye, Patrick
Sent: Monday, September 09, 2013 10:04 AM
To: 'Samson, David'; 'Scott H. Rechler '; 'bpaterson 'David Steiner'; 'jlynford 'Moerdler, Jeffrey'; 'Ken.lipper@lipper.com'; 'rpocino 'rbagger 'rossana.rosado Sartor, Anthony'; 'wpschuber
Cc: Baroni, Bill; Ma, John; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe; Wildstein, David
Subject: Domestic Steel and Jobs--September 2013 ED Report

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Re: Domestic Steel and Jobs--September 2013 Executive Director's Report

Redacted

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I look forward to discussing this further at our upcoming Board meeting.

From: McCoy, James
To: Eastman, Karen
Sent: 9/10/2013 2:29:30 PM
Subject: VSC - II - Project Authorization
Attachments: CONFIDENTIAL TERM SHEET -- MASTER - REDLINE -- 091013.docx; Exec Summary - VSC Commissioning -- MASTER -- REDLINE -- 091013.docx; Item VSC Commissioning -- MASTER - REDLINE - 091013.docx

Redacted

Redacted Here are the revised documents. Thanks.

Exec Summary - VSC Commissioning -- MASTER -- REDLINE -- 091013.docx

Item VSC Commissioning -- MASTER - REDLINE - 091013.docx

CONFIDENTIAL TERM SHEET -- MASTER - REDLINE -- 091013.docx

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Under prior authorizations through February 2010, the Board authorized $14.3 million for work in connection with the WTC Roadway Network, including preliminary and final engineering efforts for the roadway network.

At its meetings between June 2011 and February 2012, the Board authorized the award of trade contracts for heating, ventilation and air conditioning, mechanical, electrical and plumbing (MEP), vertical transportation, and building automation and temperature control associated with the construction of the WTC VCS. The contractor responsible for each system is required to conduct acceptance testing to ensure that the system performs according to contract specifications.

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CONTRACT TERM SHEET

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Under prior authorizations through February 2010, the Board authorized $14.3 million for work in connection with the WTC Roadway Network, including preliminary and final engineering efforts for the roadway network.

In October 2009, the Board authorized an agreement with Tishman to provide construction management services to support the implementation of the WTC Vehicular Security Center (WTC VSC), Eastside Tour Bus Parking Facility, West Bathtub Vehicular Access and WTC Streets Projects for a four-year term, at an estimated amount of $40.8 million.

From June 2012 thru September 2012, the Board authorized the award of early-action construction contracts, through construction manager, Tishman Construction Corporation for fire protection, electrical,

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heating, ventilation and air conditioning, and architectural fit-out work associated with the construction of the WTC Roadway Network,

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In August 2010, the Board authorized a project for the design and construction of the WTC VSC at an estimated total project cost of $667 million, including payments to contractors and consultants, payments for early-action work, a project contingency and other project costs.

At its meetings between June 2011 and February 2012, the Board authorized the award of trade contracts for heating, ventilation and air conditioning, mechanical, electrical and plumbing (MEP)vertical transportation, and building automation and temperature control associated with the design and construction of the WTC VSC. The contractor responsible for each system is required to conduct acceptance testing to ensure that each system performs according to contract specifications.

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Prior Authorizations:

December 8, 2005 - Board – Downtown Restoration Program – World Trade Center Vehicular Security Center and Tour Bus Parking Facility – Delegation Of Authority for Expert Professional Architectural and Engineering Services Agreement

September 21, 2006 – Board - Downtown Restoration Program – World Trade Center Vehicular Security Center and Tour Bus Parking Facility – Award of Expert Professional Architectural and Engineering Services Agreement

October 19, 2006 – Board – Downtown Restoration Program – WTC Vehicular Security Center and Tour Bus Parking Facility – Increase In Planning Authorization.

July 24, 2008 – Board - World Trade Center Vehicular Security Center and Tour Bus Parking Facility – Phase I – Award of Contract WTC-724.078 – Exterior Perimeter Foundation Walls and an Increase

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in Amount for Professional Services Agreement

November 6, -2008 – Board – Downtown Restoration Program – World Trade Center Eastside Tour Bus Parking Facility – Increase In Authorization To Provide Additional Planning And Expert Professional Architectural And Engineering Services

May 28, 2009 – Board – Downtown Restoration Program – World Trade Center East Side Tour Bus Parking Facility - Increase in Planning Authorization and Additional Expert Professional Architectural and Engineering Services.

October 22, 2009 – Board – Downtown Restoration Program – World Trade Center Site – Technical Support Services for Alternate East Bathtub Construction Strategy

October 22, 2009 Board – World Trade Center (WTC) Vehicular Security Center and Tour Bus Parking Facility, Eastside Tour Bus Parking Facility, West Bathtub Access and WTC Streets, Utilities and Related Infrastructure Projects – Construction Management Services

February 25, 2010 – Board – Downtown Restoration Program – World Trade Center East Side Tour Bus Parking Facility - Increase in Planning Authorization and Additional Expert Professional Architectural and Engineering Services.

August 5, 2010 Board - World Trade Center Vehicular Security Center and Tour Bus Parking Facility - Project Authorization and Award of Contract

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From: Eastman, Karen
To: McCoy, James
Sent: 9/10/2013 6:45:40 PM
Subject: RE: VSC - II - Project Authorization

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From: McCoy, James
Sent: Tuesday, September 10, 2013 2:30 PM
To: Eastman, Karen
Subject: VSC - II - Project Authorization

Redacted

Redacted Here are the revised documents. Thanks.

<< File: Exec Summary - VSC Commissioning -- MASTER -- REDLINE -- 091013.docx >> << File: Item VSC Commissioning -- MASTER - REDLINE - 091013.docx >> << File: CONFIDENTIAL TERM SHEET -- MASTER - REDLINE -- 091013.docx >>

To: Eastman, Karen[keastman@panynj.gov]
From: McCoy, James
Sent: Mon 9/9/2013 1:43:38 PM
Importance: Normal
Subject: Post Article
Received: Mon 9/9/2013 1:43:40 PM

d After marking the fifth anniversary of his Top of the Standard club during Fashion Week, hotelier Andre Balazs has reason to keep celebrating.
His company has been tapped by Port Authority officials to develop JFK's historic TWA terminal -- and Page Six can exclusively reveal that the hotel project will be called the Standard, Flight Center.
The Eero Saarinen-designed terminal will be transformed into a hotel and conference center, along with food and beverage offerings, retail space, a spa and fitness center, meeting facilities and a flight museum.
"It is a great honor to be entrusted with the preservation and revitalization of this masterpiece by my personal architectural hero," said Balazs. He added that he's looking forward to the approval of his final proposal by the PA board, but didn't comment on a specific time frame.
The agency's executive director, Pat Foye, confirmed that the PA is talking only with Balazs, saying in a statement: "The Port Authority is committed to preserving the essence of [Saarinen's] iconic design and to continuing to work with [Balazs Properties] on a plan to transform the historic TWA Flight Center into a one-of-a-kind hotel and conference center in the heart of JFK's central terminal area.
"I look forward to . . . a presentation of a final vision to the Port Authority board of commissioners for consideration," Foye said.

To: McCoy, James[jmccoy@panynj.gov]
From: Eastman, Karen
Sent: Mon 9/9/2013 1:44:20 PM
Importance: Normal
Subject: RE: Post Article
Received: Mon 9/9/2013 1:44:00 PM

d I just put it in an email to you and didn't hit the buttom. That's the one. It's the Saarinen.

From: McCoy, James
Sent: Monday, September 09, 2013 1:44 PM
To: Eastman, Karen
Subject: Post Article

After marking the fifth anniversary of his Top of the Standard club during Fashion Week, hotelier Andre Balazs has reason to keep celebrating.
His company has been tapped by Port Authority officials to develop JFK's historic TWA terminal -- and Page Six can exclusively reveal that the hotel project will be called the Standard, Flight Center.
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"I look forward to . . . a presentation of a final vision to the Port Authority board of commissioners for consideration," Foye said.

To: McCoy, James[jmccoy@panynj.gov]; Handel, Linda[lhandel@panynj.gov]
From: Eastman, Karen
Sent: Mon 9/9/2013 6:28:33 PM
Importance: Normal
Subject: Fw: NEWS ALERT: The Record: Christie administration blasts 1986 Port Authority deal selling rights to 'World Trade Center' name for $10
Received: Mon 9/9/2013 6:28:26 PM

Date: Mon, Sep 9, 2013 at 6:11 PM
Subject: NEWS ALERT: The Record: Christie administration blasts 1986 Port Authority deal selling rights to 'World Trade Center' name for $10

Christie administration blasts 1986 Port Authority deal selling rights to 'World Trade Center' name for $10

Shawn Boburg

The Record

The Christie administration on Monday slammed a decades-old Port Authority deal that sold off the rights to the World Trade Center name for $10.

"You can be sure that would never happen under this administration," a Christie spokesman, Michael Drewniak, said. "I'd venture to say that if something like that was done today, it would probably draw the attention of the United States Attorney's Office."

The Port Authority is jointly steered by appointees of the governors of New Jersey and New York. Christie is New Jersey's former top federal prosecutor. The office of New York Gov. Andrew Cuomo did not immediately respond to a request for comment.

The Christie administration's response followed a report in The Record on Sunday examining a 1986 deal in which the Port Authority sold the trademark for the name "World Trade Center" to a group run by a longtime agency executive who was about to retire. The executive, Guy Tozzoli, who retired in 1987, was president of the non-profit World Trade Centers Association for the next 24 years and earned millions. Tax filings for the group show that his compensation was $626,000 in 2011 alone, and that he worked an average of one hour a week.

He died earlier this year, but the organization is now in negotiations with the Port Authority over use of the trademark on souvenirs and other merchandise that the agency hopes to sell at One World Trade Center after it is completed next year.

The World Trade Center Association issued a statement Monday defending the organization and the deal.

It said the Port Authority "actively supported the creation of the WTCA as an entity whose mission closely parallels the Port Authority's World Trade Center concept and international trade goals." In 1986, the agency also provided the organization with office space, the statement said.

"As a further contribution to the development of the WTCA, and in return for the WTCA's agreement to provide trade information and assistance to World Trade Center constituents, in 1986 the Port Authority transferred the 'World Trade Center' service mark transparently to the WTCA as the logical organization to register the mark globally and to take legal action against infringements," the statement said.

The organization said the value of the brand "has been built since then by the WTCA at considerable cost and effort."

"The WTCA has invested millions of dollars to protect the 'World Trade Center' brand through trademark registrations and enforcement actions around the world," the statement said.

The Port Authority's deputy executive director, Bill Baroni, previously said he was "gravely concerned" about what he called "a secret deal."

The WTCA's statement said the "Port Authority does not pay to WTCA any royalty or fee to use the World Trade Center mark to brand the buildings in the New York World Trade Center complex."

But Port Authority invoices obtained by The Record show the agency has paid the association's $10,000 membership fee — which provides for use of the name — since at least 2001. The invoices include a $41,000 payment in 2001 and a total of $151,000 between 2001 and 2011. A WTCA representative did not immediately respond to a request for clarification.

- See more at: http://www.northjersey.com/news/state/Christie_administration_condemns_1986_Port_Authority_deal_to_sell_rights_to_World_Trade_Center_name_for_10.html#sthash.3xIDt0Jq.dpuf

To: McCoy, James[jmccoy@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 9:38:22 AM
Importance: Normal
Subject: FW: As discussed, is this accurate? Thx
Received: Tue 9/10/2013 9:38:00 AM

From: Ma, John
Sent: Tuesday, September 10, 2013 9:00 AM
To: Eastman, Karen
Subject: As discussed, is this accurate? Thx

Question: For major capital projects - what change order thresholds trigger a board action and/or CEO approvals ?

Draft Answer:

1. For capital projects, change orders that exceed the Board authorized $ authority for the total project budget or the Board approved contract by $2.5 million or more, go back to the Board for approval
2. This is exclusive of an amount for contingency and extra work that is generally included in the original Board authorization
3. For contract changes, including change orders, that are between $1.5m and $2.5m for publicly advertized lowest qualified bidder or highest rated RFP, then Executive Director must approve. (There are lower $ thresholds for ED approval for call-ins, MWBE, and sole-source/other procurement method contracts)
4. As general matter, there is 25% limit on amendatory authority of value of contract, above which you need to go back to the Board/ED (is this regardless of dollar threshold? For example, if $1m contract is amended for $300k or 30%, does this go back to ED or Board?)

To: McCoy, James[jmccoy@panynj.gov]; Handel, Linda[lhandel@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 6:40:56 PM
Importance: Normal
Subject: RE: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 6:40:00 PM

It was already sent to NJS and I have an email into john re NYS. Will let you know.

From: McCoy, James
Sent: Tuesday, September 10, 2013 5:46 PM
To: Eastman, Karen; Handel, Linda
Subject: RE: Legacy Program for PAPD Candidates

Am I sending it to the States?

From: Eastman, Karen
Sent: Tuesday, September 10, 2013 5:46 PM
To: Handel, Linda; McCoy, James
Subject: FW: Legacy Program for PAPD Candidates

For your files. This should be filed as a Commissioner memo so that we can easily find it in the future.

From: Dunne, Joseph P.
Sent: Tuesday, September 10, 2013 5:44 PM
To: 'dsamson ; 'srechler ; 'rbagger ; 'ken.lipper 'jlynford 'jamoerdler , 'bpaterson ; 'rmpvp ; 'rossana.rosado 'asartor 'wpschuber ; 'dss
Cc: 'jammitzbolll '; 'btorpie ; 'jalcala '; 'mmccabe ; 'dkenny 'maggie.castro Foye, Patrick; Baroni, Bill; Ma, John; Wildstein, David; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe
Subject: Legacy Program for PAPD Candidates

Commissioners,

Tomorrow marks the 12th anniversary of the terrorist attacks on the World Trade Center. On that day, 37 PAPD officers made the ultimate sacrifice in response to this unprecedented attack on our great nation. Similarly, 38 Port Authority civilians lost their lives on 9/11, which included numerous Port Authority operations staff, who also assisted in the emergency response on that day. Together these brave souls assisted in the successful evacuation of countless people on 9/11 who were fortunate enough through our PA heroes' brave efforts to return home that fateful day and kiss their loved ones goodnight. Sadly, those Port Authority employees who gave their lives that day to assist others were not so fortunate.

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As background, for many years, the Port Authority has made every effort to place children of those killed in the 1993 WTC Bombing and on September 11th who apply for civilian job openings and meet all of the qualifications. This new

"legacy" status program would extend this priority to the Police Officer job title as well and would provide those children whose parents paid the ultimate sacrifice an opportunity to pursue a career in law enforcement at the Port Authority.

This program has the full support of the Executive Director and Deputy Executive Director.

Regards,

Joe Dunne

Joseph P. Dunne
Chief Security Officer
Port Authority New York New Jersey
Office 212.435.6635

To: McCoy, James[jmccoy@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 6:47:16 PM
Importance: Normal
Subject: FW: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 6:47:00 PM

Ok to send to NYS.

From: Ma, John
Sent: Tuesday, September 10, 2013 6:47 PM
To: Eastman, Karen
Subject: RE: Legacy Program for PAPD Candidates

Sure.

From: Eastman, Karen
Sent: Tuesday, September 10, 2013 6:41 PM
To: Ma, John
Subject: Legacy Program for PAPD Candidates

Do you want this sent to NYS?

From: Dunne, Joseph P.
Sent: Tuesday, September 10, 2013 5:44 PM
To: 'dsamson(i'; 'srechler(i'; 'rbagger('; 'ken.lipper('jlynford ; 'jamoerdler '; 'bpaterson('; 'rmpvp: 'rossana.rosado: 'asartor(; 'wpschuber 'dss(
Cc: 'jammitzbolll('btorpie jalcala: 'mmccabe(; 'dkenny: 'maggie.castro ; Foye, Patrick; Baroni, Bill; Ma, John; Wildstein, David; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe
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To: McCoy, James[jmccoy@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 9:43:00 PM
Importance: Normal
Subject: FW: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 9:43:00 PM

From: Samson, David [dsamson@wolffsamson.com]
Sent: Tuesday, September 10, 2013 7:53 PM
To: Dunne, Joseph P.
Cc: srechler : rbagger ; ken.lipper ; jlynford jamoerdler ; bpaterson rmpvp rossana.rosado asartor , wpschuber . dss jammitzbolll btorpie ; jalcala . mmccabe dkenny ; maggie.castro , Foye, Patrick; Baroni, Bill; Ma, John; Wildstein, David; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe
Subject: Re: Legacy Program for PAPD Candidates

Joe: this is a wonderful idea--please confirm the proposal with Darrell Buchbinder as to process and possible other requirements, if any. Thanks.
Sent from my iPhone

On Sep 10, 2013, at 5:44 PM, "Dunne, Joseph P." <jdunne@panynj.gov<mailto:jdunne@panynj.gov>> wrote:

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Office 212.435.6635

To: McCoy, James[jmccoy@panynj.gov]; Handel, Linda[lhandel@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 6:40:56 PM
Importance: Normal
Subject: RE: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 6:40:00 PM

It was already sent to NJS and I have an email into john re NYS. Will let you know.

From: McCoy, James
Sent: Tuesday, September 10, 2013 5:46 PM
To: Eastman, Karen; Handel, Linda
Subject: RE: Legacy Program for PAPD Candidates

Am I sending it to the States?

From: Eastman, Karen
Sent: Tuesday, September 10, 2013 5:46 PM
To: Handel, Linda; McCoy, James
Subject: FW: Legacy Program for PAPD Candidates

For your files. This should be filed as a Commissioner memo so that we can easily find it in the future.

From: Dunne, Joseph P.
Sent: Tuesday, September 10, 2013 5:44 PM
To: 'dsamson 'srechler rbagger 'ken.lipper 'jlynford ;'jamoerdler : 'bpaterson '; 'rmpvp rossana.rosado 'asartor 'wpschuber 'dss
Cc: 'jammitzbolll 'btorpie , 'jalcala)'; 'mmccabe 'dkenny 'maggie.castro Foye, Patrick; Baroni, Bill; Ma, John; Wildstein, David; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe
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Office 212.435.6635

To: Handel, Linda[lhandel@panynj.gov]; McCoy, James[jmccoy@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 5:45:43 PM
Importance: Normal
Subject: FW: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 5:45:00 PM

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From: Dunne, Joseph P.
Sent: Tuesday, September 10, 2013 5:44 PM
To: 'dsamson '; 'srechler 'rbagger 'ken.lipper 'jlynford ; 'jamoerdler bpaterson ; 'rmpvp ; 'rossana.rosado 'asartor ; 'wpschuber , 'dss
Cc: 'jammitzboll , 'btorpie ; 'jalcala ; 'mmccabe . 'dkenny 'maggie.castro Foye, Patrick; Baroni, Bill; Ma, John; Wildstein, David; Buchbinder, Darrell; Eastman, Karen; Garten, David; Danielides, Philippe
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To: McCoy, James[jmccoy@panynj.gov]; Handel, Linda[lhandel@panynj.gov]
From: Eastman, Karen
Sent: Mon 9/9/2013 6:28:33 PM
Importance: Normal
Subject: Fw: NEWS ALERT: The Record: Christie administration blasts 1986 Port Authority deal selling rights to 'World Trade Center' name for $10
Received: Mon 9/9/2013 6:28:26 PM

Date: Mon, Sep 9, 2013 at 6:11 PM
Subject: NEWS ALERT: The Record: Christie administration blasts 1986 Port Authority deal selling rights to 'World Trade Center' name for $10

Christie administration blasts 1986 Port Authority deal selling rights to 'World Trade Center' name for $10

Shawn Boburg

The Record

The Christie administration on Monday slammed a decades-old Port Authority deal that sold off the rights to the World Trade Center name for $10.

"You can be sure that would never happen under this administration," a Christie spokesman, Michael Drewniak, said. "I'd venture to say that if something like that was done today, it would probably draw the attention of the United States Attorney's Office."

The Port Authority is jointly steered by appointees of the governors of New Jersey and New York. Christie is New Jersey's former top federal prosecutor. The office of New York Gov. Andrew Cuomo did not immediately respond to a request for comment.

The Christie administration's response followed a report in The Record on Sunday examining a 1986 deal in which the Port Authority sold the trademark for the name "World Trade Center" to a group run by a longtime agency executive who was about to retire. The executive, Guy Tozzoli, who retired in 1987, was president of the non-profit World Trade Centers Association for the next 24 years and earned millions. Tax filings for the group show that his compensation was $626,000 in 2011 alone, and that he worked an average of one hour a week.

He died earlier this year, but the organization is now in negotiations with the Port Authority over use of the trademark on souvenirs and other merchandise that the agency hopes to sell at One World Trade Center after it is completed next year.

The World Trade Center Association issued a statement Monday defending the organization and the deal.

It said the Port Authority "actively supported the creation of the WTCA as an entity whose mission closely parallels the Port Authority's World Trade Center concept and international trade goals." In 1986, the agency also provided the organization with office space, the statement said.

"As a further contribution to the development of the WTCA, and in return for the WTCA's agreement to provide trade information and assistance to World Trade Center constituents, in 1986 the Port Authority transferred the 'World Trade Center' service mark transparently to the WTCA as the logical organization to register the mark globally and to take legal action against infringements," the statement said.

The organization said the value of the brand "has been built since then by the WTCA at considerable cost and effort."

"The WTCA has invested millions of dollars to protect the 'World Trade Center' brand through trademark registrations and enforcement actions around the world," the statement said.

The Port Authority's deputy executive director, Bill Baroni, previously said he was "gravely concerned" about what he called "a secret deal."

The WTCA's statement said the "Port Authority does not pay to WTCA any royalty or fee to use the World Trade Center mark to brand the buildings in the New York World Trade Center complex."

But Port Authority invoices obtained by The Record show the agency has paid the association's $10,000 membership fee — which provides for use of the name — since at least 2001. The invoices include a $41,000 payment in 2001 and a total of $151,000 between 2001 and 2011. A WTCA representative did not immediately respond to a request for clarification.

- See more at:
http://www.northjersey.com/news/state/Christie_administration_condemns_1986_Port_Authority_deal_to_sell_rights_to_World_Trade_Center_name_for_10.html#sthash.3xIDt0Jq.dpuf

To: Handel, Linda[lhandel@panynj.gov]; McCoy, James[jmccoy@panynj.gov]
From: Eastman, Karen
Sent: Tue 9/10/2013 5:45:44 PM
Importance: Normal
Subject: FW: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 5:45:00 PM

For your files. This should be filed as a Commissioner memo so that we can easily find it in the future.

From: Dunne, Joseph P.
Sent: Tuesday, September 10, 2013 5:44 PM
To: 'dsamson '; 'srechler 'rbagger ; 'ken.lipper 'jlynford '; 'jamoerdler 'bpaterson '; 'rmpvp rossana.rosado ; 'asartor 'wpschuber 'dss
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Office 212.435.6635

To: Eastman, Karen[keastman@panynj.gov]; Handel, Linda[lhandel@panynj.gov]
From: McCoy, James
Sent: Tue 9/10/2013 5:46:10 PM
Importance: Normal
Subject: RE: Legacy Program for PAPD Candidates
Received: Tue 9/10/2013 5:46:11 PM

Am I sending it to the States?

From: Eastman, Karen
Sent: Tuesday, September 10, 2013 5:46 PM
To: Handel, Linda; McCoy, James
Subject: FW: Legacy Program for PAPD Candidates

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Office 212.435.6635

From: Garten, David
To: Scott Rechler
Sent: 10/15/2013 6:55:52 PM
Subject: Fwd: catching up
Attachments: Reporting and Protocol expectations.docx

FYI

Begin forwarded message:

From: "Garten, David" <dgarten@panynj.gov>
Subject: catching up
Date: October 15, 2013 6:35:39 PM EDT
To: "Simon, Brian" <bwsimon@panynj.gov>

Hey Brian -

I've been out of pocket the past few days. Had one of those bugs that just knocked me out, but I'm slowly getting back to the land of the living and plan to be at tomorrow's Board meeting.

Redacted

See you tomorrow,

David

Reporting and Protocol Expectations:

- Stay up to date on all developments concerning New York priority projects, including all New Jersey issues that may impact the State of New York, as well as the efficient operation of the Port Authority.

- Consult and coordinate with David Garten on all GOCOR initiatives as they relate to community groups, local/state/federal government and other elected officials, and organized labor. Prepare weekly report of all meetings with officials and/or their staff, in advance of the meeting(s).

- Check-in with David daily to share updates and exchange information to ensure timely and efficient communication between Port Authority New York leadership and the second floor. Inform David by phone, email, or in person of all politically sensitive issues as soon as they become known.

- Respond to emails or phone calls in a timely manner, attend and arrive on time for all Port Authority Committee and Board meetings, and NY staff meetings. Inform David in advance if unable to attend.

- Inform David of any interaction with New Jersey by phone, in-person, or email – this includes interactions with the DED and staff, NJ Government Relations staff, NJ's DC staff, and others.

- Inform David in advance of offsite meetings or tours, planned leave (personal, sick, or vacation) or travel for work-related purposes.

- Include David in all weekly GOCOR staff meetings or follow up with David on what was discussed if David is unable to attend.

From: Samson, David
Sent: Tuesday, October 22, 2013 2:32 PM
To: 'Foye, Patrick'; 'srechler(
Cc: Baroni, Bill; Buchbinder, Darrell
Subject: RE: Important - Criminal Complaint - The Port Authority of New York & New Jersey

Redacted

From: Foye, Patrick [mailto:pfoye@panynj.gov]
Sent: Tuesday, October 22, 2013 12:11 PM
To: Samson, David; 'srechler@
Cc: Baroni, Bill; Buchbinder, Darrell
Subject: Fw: Important - Criminal Complaint - The Port Authority of New York & New Jersey
Importance: High

Chairman & Vice Chairman –

I intend to forward the e-mail below to the Board as a procedural matter, and not in any way as a comment on the merits of any allegations in the e-mail. We have informed Mr. Aryai that we intend to rely on the results of any investigation of the matters that he indicated he had referred to the United States Department of Justice Public Integrity Section, the Federal Bureau of Investigation and a "local" United States Attorney.

I will also copy Darrell, Bob Van Etten and Mike Nestor on the e-mail to the Board.

Pat

From: Brian Aryai [mailto:baryai@icongroupusa.com]
Sent: Monday, October 21, 2013 03:29 PM
To: Foye, Patrick
Cc: rsadowski@sflawgroup.com <rsadowski@sflawgroup.com>
Subject: Important - Criminal Complaint - The Port Authority of New York & New Jersey

Dear Mr. Foye:

It has become unquestionably clear to me that there are criminal elements within the Port Authority of New York & New Jersey ("PANYNJ") who are intent on keeping our firm, Icon Compliance Services, LLC ("ICS"), and specifically myself, far away from your agency's books and records. It also has come to my attention that whatever submissions or proposals we put forth to do business with the PANYNJ inexplicably vanish and we receive no consideration or responses. This paper will clearly demonstrate the multiple indicia of criminal activity that my firm and I are victims of. I, therefore, request an investigation by you to be carried out by an independent party external to the PANYNJ. Concomitant with this complaint, I am filing separate and formal criminal complaints with the United States Department of Justice Public Integrity Section and the Federal Bureau of Investigation alleging public corruption charges based on my firm's experience with your agency. I am also formally notifying a local United States Attorney about the unmistakable indicia of criminality that has come to our attention.

On October 15, 2013, after checking the PANYNJ's official website, I fortuitously became aware of Mr. Basil Paterson's appointment to your Board of Commissioners in June of 2013. Astoundingly, no one, including former Governor Paterson, had previously informed me about the aforesaid appointment. I will leave it to federal law enforcement to determine the circumstances and the true motivation leading to Mr. Basil Paterson's appointment to the board, when one considers that his own son had an impending earlier application for certification for a minority owned business with your agency, as well as the existence of several bids submitted to PANYNJ by ICS that were pending from months earlier. It is also quite shocking to me that, apparently, no one from your agency raised a red flag that there was a conflict concerning the impending matters referenced above when the appointment was implemented and announced. Former Governor Paterson's role in ICS was known both to you and Mr. Moerdler long before the appointment of Mr. Basil Paterson. Given the structure of our organization and the emerging conflict of interest which I discovered from this surprisingly unexpected appointment, affecting our impending bids with the PANYNJ, I immediately communicated with former Governor Paterson's assistant regarding my discovery and requested Mr. Paterson's resignation. In turn, former Governor Paterson formally tendered his resignation from ICS on October 16 and relinquished all interest and equity in the firm.

As you are aware, I have been credited, publicly, for the discovery, investigation and presentation for prosecution of the largest fraud scheme on record in the construction industry. When we met approximately a year ago, I offered to provide my unique insight and experience to assist the PANYNJ in uncovering construction fraud at the agency, you were receptive and agreed to contact Mr. Robert E. Vän Etten, PANYNJ's Inspector General to schedule a meeting, so that my firm could offer its services to the PANYNJ.

Unfortunately, I happen to know Mr. Van Etten extremely well from my service as a United States Treasury/Customs Service special agent for fourteen years, where cronyism, corruption and blatant discrimination was quite commonplace while he occupied the position of Special Agent in Charge at the New York Office. Mr. Van Etten migrated to the PANYNJ with an assemblage of former cronies from the U.S. Customs Service not particularly known for investigative brilliance. In fact neither Mr. Van Etten nor Mr. Michael Nestor, his Director of Investigations at the PANYNJ, are known for any criminal investigative accomplishment as case agents while at the U.S, Customs Service. I would be extremely surprised if a federal criminal complaint could be found by either of these individuals, as case agents, in a substantial criminal investigation.

Mr. Van Etten is exceptionally adroit at taking credit for the hard work of others. Ironically, I have witnessed this behavioral trait of his, at my own expense, throughout my career. To cite a clear example, I have attached Mr. Van Etten's cosmetically profound, yet hollow and meaningless, comments (Exhibit A) at the press conference marking the announcement of the case that was entirely sourced due to my efforts and diligence. It is readily noticeable from Mr. Van Etten's comments that he did not even mention my hard work and effort, while I sacrificed my personal familial life and safety, was ever broached as he pounded his chest on the podium in yet another coveted press conference. Consistent with his history of building empires within a carefully designed public relations apparatus, once again, Mr. Van Etten hijacked credit for the work of others. I experienced the untenably deplorable and unethical misconduct by Mr. Van Etten both at the U.S. Customs Service and again as a senior construction executive, as evidenced by the press release I have attached. After years of literally watching my back and having exposed what was and continues to remain unprecedented in the history of rampant construction corruption in the New York metropolitan area, I felt deeply betrayed. As a child, I successfully escaped Iran where Islamist radicals intent on discriminating against me murdered my family members. As a federal agent I effectively survived shootouts with violent criminals. However, apparently, I cannot shake off staying in Mr. Van Etten's crosshairs.

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I have attached Mr. Van Etten's assistant's email to Mr. Dallek, my associate, herewith (Exhibit B). The email is dated April 8, 2013. I urge you to consider how often Mr. Van Etten has personally met with favored contractors, including Toby Thacher of Thacher Associates, who has been granted monetarily significant contracts under Mr. Van Etten's direction and tenure. Evidently, your Inspector General adheres to a different set of rules for a firm that is technically superior, honest and fully independent.

Over several decades, the construction integrity monitoring and compliance contracting mechanism has become a fraud onto itself. I learned sobering insight from a ringside seat into this sham, while serving as Lend Lease's chief financial officer and controller of the New York office, when I managed $3 billion in annual revenues. When it comes to retaining a monitor, the construction industry has its "go to guys". It became clear to me, in the course of my tenure as a construction executive, that for most construction companies, the most favored "go to guy" is and continues to be Thacher Associates, for whom Mr. Van Etten and his acolytes have endless affinity. Numerous rankings by your Office of Inspector General of various bidders in past RFPs evidence this point, where Thacher Associates is hailed as a heroic figure in the industry and praised incessantly. These long favored monitors, who have entrenched themselves in the industry, in turn ensure that the monitoring goes "smoothly" and no scandals surface. This disgraceful condition is so blatant and evident that even the major national news media has learned about it and is conducting its own investigation. It also directly explains the ongoing chronic corruption that is never cured within the construction industry. Conversely, not so blessed are the monitoring and compliance contractors who are objective, independent and truthful in their reporting, which explains why reputable firms such as Doar Rieck Kaley and Mack LLP and our firm are left to pick up the scraps, if any, in this lucrative arena.

The corrupt mechanism for awarding these monitoring contracts is the single most significant cause for the perpetuity of rampant fraud and corruption within the construction industry, especially in the New York metropolitan area. It is my belief that there is abundant evidence, which sadly has escaped the attention of law enforcement, to bring criminal charges against these dishonest integrity monitors who absurdly lack integrity themselves. However doing so would involve an aggressive and thorough investigation, which would result in a much overdue cleansing of the construction industry and would identify criminal elements deeply rooted in public agencies, including the PANYNJ, who steer monitoring and compliance contracts to disreputable and corrupt monitors.

When I discovered and investigated the "gratis pay" or "8+2" fraud, it took me only one day to determine that the hours at the Deutche Bank demolition project at 130 Liberty Street was wholly afflicted with the fraud, which entailed openly adding fraudulent overtime hours to foremen's hours. As you are aware, this fraudulent scheme has now been described by many in the media as the largest fraudulent scheme in the construction industry. Thacher Associates was the contracted monitor at the Deutche Bank project site, funded by the LMDC, and billed substantial fees for monitoring services, which included numerous individuals from the firm who observed and investigated physical access to the job site and conducted audits of the payroll there. Yet, the inescapable presence of this fraud was never reported by Thacher Associates. When I inquired with Christopher Soleberry, my subordinate project accountant assigned to that project, he informed me that Thacher Associates was fully aware of the fraud and that in his discussions with Thacher Associates monitors, Mr. Soleberry was told the practice was pervasive throughout the industry for decades and, in essence, that is just the way things are. Additionally, Mr. James Abadie, the principal of Lend Lease, who pled guilty to charges arising from my investigation, on many occasions had battled with me, while we worked at the company, to cease my investigation and "let Toby take care of things"; I declined. Unfortunately, while even the news media has apparently sniffed out the existence of this obvious construction monitoring sham, these palpable conditions escaped the investigators and prosecutors so far. Interestingly, upon recognition of the extent of the fraud, in haste, shortly after the announcement by the United States Attorney, EDNY, of convictions and a deferred prosecution agreement resulting from my discovery and investigation, Thacher Associates was conveniently sold to K2 Intelligence. The timing for this sale was not coincidental. The time has come for a thorough investigation and cleansing of the corrupt elements in the industry and their associates who have infiltrated public agencies that ensure contracts are awarded to a select and corrupt few.

There have been multiple events in our quest to do business with the PANYNJ that inarguably have established the existence of a pattern of unlawful public corruption by internal criminal elements within your agency, who ostensibly have plans of their own for personal benefit. I am committed to the pursuit of justice to reverse these unacceptable conditions. I trust you will act in the same spirit. With that said, below is a factual chronology of events my firm has experienced in seeking to conduct business with the PANYNJ. These facts, I am certain, you will conclude are irrefutable evidence of a pattern of criminal activity committed by culpable subordinates of yours. I allege that these criminal activities represent blatant public corruption of the worst kind within your agency.

Furthermore, I strongly suspect that these criminal activities were planned and executed by elements within your agency's Office of Inspector General. As articulated in this communication, I will demonstrate to you in detail the basis of our gravamen and our justification for demanding an internal investigation <u>not to be carried out by your agency's Inspector General</u>. Below you will find a detailed and factual account of the relevant events in a chorological fashion:

I. <u>Formation of Icon Compliance Services, LLC, and our submission to the PANYNJ for certification as a minority owned business</u>

In October of 2012, former New York State Governor Paterson and I pooled our respective experiences together and founded Icon Compliance Services, LLC ("ICS"), to address the glaring and obvious absence of genuinely truthful integrity monitoring and compliance oversight over the construction industry. Our submission for certification as a minority owned business was hand delivered on April 11, 2013, to Ms. Cecilia A. Wallace at the PANYNJ, who had then informed me that the process would take no longer than four months, at a maximum, and that we would receive our certification "probably earlier than that" due to the fact that ownership of our firm was clearly observable by known and prominent individuals. I have attached our cover letter, authored by former Governor David A. Paterson for the referenced submission (Exhibit C). It is now well over six (6) months since our submission and our application has apparently disappeared into a dark hole. We were never contacted. In light of former Governor Paterson's resignation and dissociation with ICS, referenced earlier, I am hereby withdrawing this application. Nevertheless, I demand an explanation for the lack of acknowledgment and response by the PANYNJ regarding this application.

II. <u>Submission of our proposal for RFP # 32769</u>

We submitted our proposal for integrity monitoring services, by hand, for the above referenced project on April 22, 2013. There has been absolutely no communication back to us and we now are hearing, anecdotally, that the project was secretly awarded to Guidepost Solutions LLC. A search on the Internet disclosed that Freedom of Information of Act ("FOIA") requests were filed with the PANYNJ for the circumstances of this allegedly secret award that have been denied. I demand information on the status of this RFP including explanations of why we have not received any acknowledgment of our submission. If this project has been awarded, I demand to know why the PANYNJ has apparently elected not to follow the standard process which governs the decision. Furthermore, I demand to know why our firm was not considered for this award, if it has been completed. Our submission letter (Exhibit D) is attached for your review.

III. <u>Submission of our proposal for RFP # 33020</u>

We submitted our proposal, which contained unparalleled airport and law enforcement experience, for the performance of security audit services at the five major airports and the World Trade Center on May 29, 2013. The PANYNJ staff handling the proposal was actively engaged in discussions with our firm. Then, inexplicably and suddenly, all communications ceased and our efforts met total silence. The contract with the incumbent vendor has since been unaccountably extended. Our submission included a team of professionals that was far superior to the staff employed by the incumbent. The course of events leads us to believe that an internal element with the PANYNJ obstructed our ability to be considered for this bid. Our cover letter for the aforesaid submission (Exhibit E) is attached for your review.

IV. Conclusion

-

In conclusion, viewed reasonably and objectively, the events referenced above, taken in light of the totality of the circumstances, are clearly not accidental or coincidentally isolated matters. In my professional assessment, these unlawful acts were carefully planned, orchestrated and executed to deprive us from being equally considered to do business under the law. These criminally suspect actions are quite serious and require your immediate attention. Any meaningful investigation would require a thorough financial analysis, including net worth and expenditures methods, of personal finances of the senior employees of your Office of the Inspector General. We look forward to hearing from you in a timely fashion and expect that you will take appropriate and immediate corrective and disciplinary actions based on the facts I have provided herewith. We also would appreciate a formal and belated response to all of our impending submissions for projects in accordance to internal policies of the PANYNJ and applicable statutory requirements under the law.

Regards,

Brian S. Aryai, CPA, CFF, CIA, CFE
Chief Executive Officer
Icon Compliance Services, LLC
6 E 45th Street, Suite 901, New York, NY 10017 *(212) 758-8054
470 3rd Street South, Suite 512, St. Petersburg, FL 33701
baryai@icongroupusa.com

To: Foye, Patrick; 'srechler
Cc: Baroni, Bill; Buchbinder, Darrell
Subject: RE: Important - Criminal Complaint - The Port Authority of New York & New Jersey

Redacted

From: Foye, Patrick [mailto:pfoye@panynj.gov]
Sent: Tuesday, October 22, 2013 12:11 PM
To: Samson, David; 'srechler
Cc: Baroni, Bill; Buchbinder, Darrell
Subject: Fw: Important - Criminal Complaint - The Port Authority of New York & New Jersey
Importance: High

Chairman & Vice Chairman –

I intend to forward the e-mail below to the Board as a procedural matter, and not in any way as a comment on the merits of any allegations in the e-mail. We have informed Mr. Aryai that we intend to rely on the results of any investigation of the matters that he indicated he had referred to the United States Department of Justice Public Integrity Section, the Federal Bureau of Investigation and a "local" United States Attorney.

I will also copy Darrell, Bob Van Etten and Mike Nestor on the e-mail to the Board.

Pat

From: Brian Aryai [mailto:baryai@icongroupusa.com]
Sent: Monday, October 21, 2013 03:29 PM
To: Foye, Patrick
Cc: rsadowski@sflawgroup.com <rsadowski@sflawgroup.com>
Subject: Important - Criminal Complaint - The Port Authority of New York & New Jersey

Dear Mr. Foye:

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III. Submission of our proposal for RFP # 33020

We submitted our proposal, which contained unparalleled airport and law enforcement experience, for the performance of security audit services at the five major airports and the World Trade Center on May 29, 2013. The PANYNJ staff handling the proposal was actively engaged in discussions with our firm. Then, inexplicably and suddenly, all communications ceased and our efforts met total silence. The contract with the incumbent vendor has since been unaccountably extended. Our submission included a team of professionals that was far superior to the staff employed by the incumbent. The course of events leads us to believe that an internal element with the PANYNJ obstructed our ability to be considered for this bid. Our cover letter for the aforesaid submission (Exhibit E) is attached for your review.

IV. Conclusion

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In conclusion, viewed reasonably and objectively, the events referenced above, taken in light of the totality of the circumstances, are clearly not accidental or coincidentally isolated matters. In my professional assessment, these unlawful acts were carefully planned, orchestrated and executed to deprive us from being equally considered to do business under the law. These criminally suspect actions are quite serious and require your immediate attention. Any meaningful investigation would require a thorough financial analysis, including net worth and expenditures methods, of personal finances of the senior employees of your Office of the Inspector General. We look forward to hearing from you in a timely fashion and expect that you will take appropriate and immediate corrective and disciplinary actions based on the facts I have provided herewith. We also would appreciate a formal and belated response to all of our impending submissions for projects in accordance to internal policies of the PANYNJ and applicable statutory requirements under the law.

Regards,

Brian S. Aryai, CPA, CFF, CIA, CFE
Chief Executive Officer
Icon Compliance Services, LLC
6 E 45th Street, Suite 901, New York, NY 10017 *(212) 758-8054
470 3rd Street South, Suite 512, St. Petersburg, FL 33701
baryai@icongroupusa.com

From: Buchbinder, Darrell <dbuchbin@panynj.gov>
Sent: Tuesday, December 10, 2013 7:24 PM
To: Samson, David
Cc: Rechler, Scott
Subject: RE: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee
Attachments: AI 20-1.18_Whistleblower Protection.pdf; OIG Poster_Report Fraud.pdf

Redacted

Darrell Buchbinder
General Counsel
The Port Authority of New York and New Jersey
225 Park Avenue South, 15th Floor
New York, NY 10003
(212) 435-3515

From: Samson, David
Sent: Tuesday, December 10, 2013 4:41 PM
To: Buchbinder, Darrell
Cc: Rechler, Scott
Subject: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

Redacted

Redacted

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Please Note: The information contained in this email message is a PRIVATE communication that may contain confidential attorney-client information. If you are not the intended recipient, do not read, copy or use it or disclose it to others. If you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.

Thank you.

****

IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient or any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.

****

If you know something, say something.

Report fraud to the Office of Inspector General.

Reports remain strictly confidential
and can be made anonymously.

Employees are protected from retaliation under the Port Authority's
Whistleblower Protection Policy (AI 20-1.19).

To report, call: 973.565.4340

E-mail: InspectorGeneral@panynj.gov
Fax: [illegible]
Mail: The Port Authority of NY & NJ
Office of Inspector General
Attn.: Hotline
P.O. Box [illegible]
Hoboken, NJ 07030

THE PORT AUTHORITY OF NY & NJ

From: Buchbinder, Darrell <dbuchbin@panynj.gov>
Sent: Tuesday, December 10, 2013 8:59 PM
To: Nestor, Michael; Van Etten, Robert
Cc: Samson, David; Rechler, Scott
Subject: FW: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee
Attachments: AI 20-1.18_Whistleblower Protection.pdf; OIG Poster_Report Fraud.pdf

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General Counsel
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To report, call: 973.565.4340

E-mail: InspectorGeneral@panynj.gov
Fax: 973.565.4307
Mail: The Port Authority of NY & NJ
Office of Inspector General
Attn.: Hotline
P.O. Box 2048
Hoboken, NJ 07030

THE PORT AUTHORITY OF NY & NJ

From: Buchbinder, Darrell <dbuchbin@panynj.gov>
Sent: Tuesday, December 10, 2013 8:59 PM
To: Nestor, Michael; Van Etten, Robert
Cc: Samson, David; Rechler, Scott
Subject: FW: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee
Attachments: AI 20-1.18_Whistleblower Protection.pdf; OIG Poster_Report Fraud.pdf

Redacted

Darrell Buchbinder
General Counsel
The Port Authority of New York and New Jersey
225 Park Avenue South, 15th Floor
New York, NY 10003
(212) 435-3515

From: Buchbinder, Darrell
Sent: Tuesday, December 10, 2013 7:24 PM
To: 'Samson, David'
Cc: Rechler, Scott
Subject: RE: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

Redacted

Darrell Buchbinder
General Counsel
The Port Authority of New York and New Jersey

225 Park Avenue South, 15th Floor
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(212) 435-3515

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From: Samson, David
Sent: Tuesday, December 10, 2013 4:41 PM
To: Buchbinder, Darrell
Cc: Rechler, Scott
Subject: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

Redacted

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THE PORT AUTHORITY OF NY & NJ

Rechler, Scott

From: Rechler, Scott
Sent: Tuesday, December 10, 2013 6:55 PM
To: David Garten
Subject: FW: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

FYI ... Please keep to yourself since he didn't copy anyone else.

From: Samson, David
Sent: Tuesday, December 10, 2013 4:41 PM
To: dbuchbin@panynj.gov
Cc: Rechler, Scott
Subject: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

Redacted

From: Rechler, Scott
Sent: Wednesday, December 11, 2013 5:49 PM
To: Foye, Patrick
Subject: FW: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

FYI ... Sorry was tied up in a meeting. Also, want to regroup about our conversations on the other two guys. Thanks.

From: Samson, David
Sent: Tuesday, December 10, 2013 4:41 PM
To: dbuchbln@panynj.gov
Cc: Rechler, Scott
Subject: New Jersey Assembly Transportation, Public Works & Independent Authorities Committee

Redacted

To: Garten, David[dgarten@panynj.gov]; MacSpadden, Lisa[lmacspadden@panynj.gov]
From: Rechler, Scott
Sent: Thur 11/7/2013 7:49:43 AM
Importance: Normal
Subject: FW: Wall Street Journal story/GWB
Received: Thur 11/7/2013 7:51:03 AM

Did this story come out? I didn't see it.

From: Coleman, Steve [mailto:scoleman@panynj.gov]
Sent: Wednesday, November 06, 2013 10:55 AM
To: Samson, David; Rechler, Scott; Foye, Patrick; Baroni, Bill
Cc: Wildstein, David; Ma, John; MacSpadden, Lisa; Danielides, Philippe; Garten, David
Subject: Wall Street Journal story/GWB

All:

We were contacted this morning by Ted Mann of the Wall Street Journal, who informed us that he is writing another story about the September closing of the GWB local access lanes. The story will be published tomorrow. Ted told us that the story will lead with a description of David Wildstein's order to Bob Durando and Cedrick Fulton to close the local access lanes on the bridge in early September and also will note that David visited the bridge that Monday morning – the first day of the closings -- to make sure the order was carried out and to observe the traffic conditions. The story will further refute any notion that this was part of a traffic study. Ted is looking to give several people in the Port Authority leadership an opportunity to comment, including the chair, vice chair, Pat, Bill, David, Bob Durando and Cedrick. Ted also mentioned that he may try to reach these individuals through other means. We will not respond to this inquiry unless directed to do so.

From: Garten, David
To: 'srechler(
Sent: 11/21/2013 12:53:43 PM
Subject: FW: Politicker NJ inquiry -- GWB lane closure hearing in Trenton

Give me a call when you have a minute to discuss. I'd like to get your take on our next steps. Pat has a call into the 2nd floor and he's supposed to meet with Bill later this afternoon.

From: Ma, John
Sent: Thursday, November 21, 2013 12:47 PM
To: Garten, David
Subject: Fw: Politicker NJ inquiry -- GWB lane closure hearing in Trenton

---

From: Baroni, Bill
Sent: Thursday, November 21, 2013 12:05 PM
To: Coleman, Steve
Cc: Foye, Patrick; Ma, John; Wildstein, David; MacSpadden, Lisa
Subject: Re: Politicker NJ inquiry -- GWB lane closure hearing in Trenton

No response

Sent from my iPhone

On Nov 21, 2013, at 11:20 AM, "Coleman, Steve" <scoleman@panynj.gov> wrote:

Bill Mooney of Politicker NJ called to inquire about whether anyone from the Port Authority will be attending the GWB lane closure hearing scheduled for Monday in Trenton. I will not respond unless instructed otherwise to do so.

From: Foye, Patrick <pfoye@panynj.gov>
Sent: Tuesday, October 22, 2013 12:11 PM
To: Samson, David; 'srechler
Cc: Baroni, Bill; Buchbinder, Darrell
Subject: Fw: Important - Criminal Complaint - The Port Authority of New York & New Jersey
Attachments: Exhibit A.PDF; Exhibit B.PDF; Exhibit C.PDF; Exhibit D.PDF; Exhibit E.PDF

Importance: High

Chairman & Vice Chairman –

I intend to forward the e-mail below to the Board as a procedural matter, and not in any way as a comment on the merits of any allegations in the e-mail. We have informed Mr. Aryai that we intend to rely on the results of any investigation of the matters that he indicated he had referred to the United States Department of Justice Public Integrity Section, the Federal Bureau of Investigation and a "local" United States Attorney.

I will also copy Darrell, Bob Van Etten and Mike Nestor on the e-mail to the Board.

Pat

From: Brian Aryai [mailto:baryai@icongroupusa.com]
Sent: Monday, October 21, 2013 03:29 PM
To: Foye, Patrick
Cc: rsadowski@sflawgroup.com <rsadowski@sflawgroup.com>
Subject: Important - Criminal Complaint - The Port Authority of New York & New Jersey

Dear Mr. Foye:

It has become unquestionably clear to me that there are criminal elements within the Port Authority of New York & New Jersey ("PANYNJ") who are intent on keeping our firm, Icon Compliance Services, LLC ("ICS"), and specifically myself, far away from your agency's books and records. It also has come to my attention that whatever submissions or proposals we put forth to do business with the PANYNJ inexplicably vanish and we receive no consideration or responses. This paper will clearly demonstrate the multiple indicia of criminal activity that my firm and I are victims of. I, therefore, request an investigation by you to be carried out by an independent party external to the PANYNJ. Concomitant with this complaint, I am filing separate and formal criminal complaints with the United States Department of Justice Public Integrity Section and the Federal Bureau of Investigation alleging public corruption charges based on my firm's experience with your agency. I am also formally notifying a local United States Attorney about the unmistakable indicia of criminality that has come to our attention.

On October 15, 2013, after checking the PANYNJ's official website, I fortuitously became aware of Mr. Basil Paterson's appointment to your Board of Commissioners in June of 2013. Astoundingly, no one, including former Governor Paterson, had previously informed me about the aforesaid appointment. I will leave it to federal law enforcement to determine the circumstances and the true motivation leading to Mr. Basil Paterson's appointment to the board, when one considers that his own son had an impending earlier application for certification for a minority owned business with your agency, as well as the existence of several bids submitted to PANYNJ by ICS that were pending from months earlier. It is also quite shocking to me that, apparently, no one from your agency raised a red flag that there was a conflict concerning the impending matters referenced above when the appointment was implemented and announced. Former Governor Paterson's role in ICS was known both to you and Mr. Moerdler long before the appointment of Mr. Basil Paterson. Given the structure of our organization and the emerging conflict of interest which I discovered from this surprisingly unexpected appointment, affecting our impending bids with the PANYNJ, I immediately communicated with former Governor Paterson's assistant regarding my discovery and requested Mr. Paterson's resignation. In turn, former Governor Paterson formally tendered his resignation from ICS on October 16 and relinquished all interest and equity in the firm.

As you are aware, I have been credited, publicly, for the discovery, investigation and presentation for prosecution of the largest fraud scheme on record in the construction industry. When we met approximately a year ago, I offered to provide my unique insight and experience to assist the PANYNJ in uncovering construction fraud at the agency, you were receptive and agreed to contact Mr. Robert E. Van Etten, PANYNJ's Inspector General to schedule a meeting, so that my firm could offer its services to the PANYNJ.

Unfortunately, I happen to know Mr. Van Etten extremely well from my service as a United States Treasury/Customs Service special agent for fourteen years, where cronyism, corruption and blatant discrimination was quite commonplace while he occupied the position of Special Agent in Charge at the New York Office. Mr. Van Etten migrated to the PANYNJ with an assemblage of former cronies from the U.S. Customs Service not particularly known for investigative brilliance. In fact neither Mr. Van Etten nor Mr. Michael Nestor, his Director of Investigations at the PANYNJ, are known for any criminal investigative accomplishment as case agents while at the U.S, Customs Service. I would be extremely surprised if a federal criminal complaint could be found by either of these individuals, as case agents, in a substantial criminal investigation.

Mr. Van Etten is exceptionally adroit at taking credit for the hard work of others. Ironically, I have witnessed this behavioral trait of his, at my own expense, throughout my career. To cite a clear example, I have attached Mr. Van Etten's cosmetically profound, yet hollow and meaningless, comments (Exhibit A) at the press conference marking the announcement of the case that was entirely sourced due to my efforts and diligence. It is readily noticeable from Mr. Van Etten's comments that he did not even mention my hard work and effort, while I sacrificed my personal familial life and safety, was ever broached as he pounded his chest on the podium in yet another coveted press conference. Consistent with his history of building empires within a carefully designed public relations apparatus, once again, Mr. Van Etten hijacked credit for the work of others. I experienced the untenably deplorable and unethical misconduct by Mr. Van Etten both at the U.S. Customs Service and again as a senior construction executive, as evidenced by the press release I have attached. After years of literally watching my back and having exposed what was and continues to remain unprecedented in the history of rampant construction corruption in the New York metropolitan area, I felt deeply betrayed. As a child, I successfully escaped Iran where Islamist radicals intent on discriminating against me murdered my family members. As a federal agent I effectively survived shootouts with violent criminals. However, apparently, I cannot shake off staying in Mr. Van Etten's crosshairs.

When you suggested that I meet with Mr. Van Etten to offer our firm's services, I overlooked my horrid experience with him, as a U. S. Customs Service special agent and again as a construction executive, and attempted to turn a new page. However, leopards do not change their spots. Mr. Van Etten, in a letter authored by his assistant, declined to meet with my firm due to a falsely asserted fear of "an appearance issue".

I have attached Mr. Van Etten's assistant's email to Mr. Dallek, my associate, herewith (Exhibit B). The email is dated April 8, 2013. I urge you to consider how often Mr. Van Etten has personally met with favored contractors, including Toby Thacher of Thacher Associates, who has been granted monetarily significant contracts under Mr. Van Etten's direction and tenure. Evidently, your Inspector General adheres to a different set of rules for a firm that is technically superior, honest and fully independent.

Over several decades, the construction integrity monitoring and compliance contracting mechanism has become a fraud onto itself. I learned sobering insight from a ringside seat into this sham, while serving as Lend Lease's chief financial officer and controller of the New York office, when I managed $3 billion in annual revenues. When it comes to retaining a monitor, the construction industry has its "go to guys". It became clear to me, in the course of my tenure as a construction executive, that for most construction companies, the most favored "go to guy" is and continues to be Thacher Associates, for whom Mr. Van Etten and his acolytes have endless affinity. Numerous rankings by your Office of Inspector General of various bidders in past RFPs evidence this point, where Thacher Associates is hailed as a heroic figure in the industry and praised incessantly. These long favored monitors, who have entrenched themselves in the industry, in turn ensure that the monitoring goes "smoothly" and no scandals surface. This disgraceful condition is so blatant and evident that even the major national news media has learned about it and is conducting its own investigation. It also directly explains the ongoing chronic corruption that is never cured within the construction industry. Conversely, not so blessed are the monitoring and compliance contractors who are objective, independent and truthful in their reporting, which explains why reputable firms such as Doar Rieck Kaley and Mack LLP and our firm are left to pick up the scraps, if any, in this lucrative arena.

The corrupt mechanism for awarding these monitoring contracts is the single most significant cause for the perpetuity of rampant fraud and corruption within the construction industry, especially in the New York metropolitan area. It is my belief that there is abundant evidence, which sadly has escaped the attention of law enforcement, to bring criminal charges against these dishonest integrity monitors who absurdly lack integrity themselves. However doing so would involve an aggressive and thorough investigation, which would result in a much overdue cleansing of the construction industry and would identify criminal elements deeply rooted in public agencies, including the PANYNJ, who steer monitoring and compliance contracts to disreputable and corrupt monitors.

When I discovered and investigated the "gratis pay" or "8+2" fraud, it took me only one day to determine that the hours at the Deutche Bank demolition project at 130 Liberty Street was wholly afflicted with the fraud, which entailed openly adding fraudulent overtime hours to foremen's hours. As you are aware, this fraudulent scheme has now been described by many in the media as the largest fraudulent scheme in the construction industry. Thacher Associates was the contracted monitor at the Deutche Bank project site, funded by the LMDC, and billed substantial fees for monitoring services, which included numerous individuals from the firm who observed and investigated physical access to the job site and conducted audits of the payroll there. Yet, the inescapable presence of this fraud was never reported by Thacher Associates. When I inquired with Christopher Soleberry, my subordinate project accountant assigned to that project, he informed me that Thacher Associates was fully aware of the fraud and that in his discussions with Thacher Associates monitors, Mr. Soleberry was told the practice was pervasive throughout the industry for decades and, in essence, that is just the way things are. Additionally, Mr. James Abadie, the principal of Lend Lease, who pled guilty to charges arising from my investigation, on many occasions had battled with me, while we worked at the company, to cease my investigation and "let Toby take care of things"; I declined.

Unfortunately, while even the news media has apparently sniffed out the existence of this obvious construction monitoring sham, these palpable conditions escaped the investigators and prosecutors so far. Interestingly, upon recognition of the extent of the fraud, in haste, shortly after the announcement by the United States Attorney, EDNY, of convictions and a deferred prosecution agreement resulting from my discovery and investigation, Thacher Associates was conveniently sold to K2 Intelligence. The timing for this sale was not coincidental. The time has come for a thorough investigation and cleansing of the corrupt elements in the industry and their associates who have infiltrated public agencies that ensure contracts are awarded to a select and corrupt few.

There have been multiple events in our quest to do business with the PANYNJ that inarguably have established the existence of a pattern of unlawful public corruption by internal criminal elements within your agency, who ostensibly have plans of their own for personal benefit. I am committed to the pursuit of justice to reverse these unacceptable conditions. I trust you will act in the same spirit. With that said, below is a factual chronology of events my firm has experienced in seeking to conduct business with the PANYNJ. These facts, I am certain, you will conclude are irrefutable evidence of a pattern of criminal activity committed by culpable subordinates of yours. I allege that these criminal activities represent blatant public corruption of the worst kind within your agency.

Furthermore, I strongly suspect that these criminal activities were planned and executed by elements within your agency's Office of Inspector General. As articulated in this communication, I will demonstrate to you in detail the basis of our gravamen and our justification for demanding an internal investigation not to be carried out by your agency's Inspector General. Below you will find a detailed and factual account of the relevant events in a chorological fashion:

I. Formation of Icon Compliance Services, LLC, and our submission to the PANYNJ for certification as a minority owned business

In October of 2012, former New York State Governor Paterson and I pooled our respective experiences together and founded Icon Compliance Services, LLC ("ICS"), to address the glaring and obvious absence of genuinely truthful integrity monitoring and compliance oversight over the construction industry. Our submission for certification as a minority owned business was hand delivered on April 11, 2013, to Ms. Cecilia A. Wallace at the PANYNJ, who had then informed me that the process would take no longer than four months, at a maximum, and that we would receive our certification "probably earlier than that" due to the fact that ownership of our firm was clearly observable by known and prominent individuals. I have attached our cover letter, authored by former Governor David A. Paterson for the referenced submission (Exhibit C). It is now well over six (6) months since our submission and our application has apparently disappeared into a dark hole. We were never contacted. In light of former Governor Paterson's resignation and dissociation with ICS, referenced earlier, I am hereby withdrawing this application. Nevertheless, I demand an explanation for the lack of acknowledgment and response by the PANYNJ regarding this application.

II. Submission of our proposal for RFP # 32769

We submitted our proposal for integrity monitoring services, by hand, for the above referenced project on April 22, 2013. There has been absolutely no communication back to us and we now are hearing, anecdotally, that the project was secretly awarded to Guidepost Solutions LLC. A search on the Internet disclosed that Freedom of Information of Act ("FOIA") requests were filed with the PANYNJ for the circumstances of this allegedly secret award that have been denied. I demand information on the status of this RFP including explanations of why we have not received any acknowledgment of our submission. If this project has been awarded, I demand to know why the PANYNJ has apparently elected not to follow the standard process which governs the decision. Furthermore, I demand to know why our firm was not considered for this award, if it has been completed. Our submission letter (Exhibit D) is attached for your review.

III. Submission of our proposal for RFP # 33020

We submitted our proposal, which contained unparalleled airport and law enforcement experience, for the performance of security audit services at the five major airports and the World Trade Center on May 29, 2013. The PANYNJ staff handling the proposal was actively engaged in discussions with our firm. Then, inexplicably and suddenly, all communications ceased and our efforts met total silence. The contract with the incumbent vendor has since been unaccountably extended. Our submission included a team of professionals that was far superior to the staff employed by the incumbent. The course of events leads us to believe that an internal element with the PANYNJ obstructed our ability to be considered for this bid. Our cover letter for the aforesaid submission (Exhibit E) is attached for your review.

IV. Conclusion

In conclusion, viewed reasonably and objectively, the events referenced above, taken in light of the totality of the circumstances, are clearly not accidental or coincidentally isolated matters. In my professional assessment, these unlawful acts were carefully planned, orchestrated and executed to deprive us from being equally considered to do business under the law. These criminally suspect actions are quite serious and require your immediate attention. Any meaningful investigation would require a thorough financial analysis, including net worth and expenditures methods, of personal finances of the senior employees of your Office of the Inspector General. We look forward to hearing from you in a timely fashion and expect that you will take appropriate and immediate corrective and disciplinary actions based on the facts I have provided herewith. We also would appreciate a formal and belated response to all of our impending submissions for projects in accordance to internal policies of the PANYNJ and applicable statutory requirements under the law.

Regards,

Brian S. Aryal, CPA, CFF, CIA, CFE
Chief Executive Officer
Icon Compliance Services, LLC
6 E 45th Street, Suite 901, New York, NY 10017 *(212) 758-8054
470 3rd Street South, Suite 512, St. Petersburg, FL 33701
baryai@icongroupusa.com

From: Foye, Patrick <pfoye@panynj.gov>
Sent: Tuesday, October 22, 2013 12:56 PM
To: Samson, David; 'Rechler, Scott'; 'bpaterson; '; 'David Steiner'; 'Jeff Lynford'; 'Moerdler, Jeffrey'; 'rpocino('; 'rbagger(n'; 'rossana.rosado 'Sartor, Anthony'; 'wpschuber 'rossana.rosado(
Cc: Baroni, Bill; Buchbinder, Darrell; Van Etten, Robert; Nestor, Michael; Ma, John
Subject: FW: Important - Criminal Complaint - The Port Authority of New York & New Jersey
Attachments: Exhibit A.PDF; Exhibit B.PDF; Exhibit C.PDF; Exhibit D.PDF; Exhibit E.PDF

Commissioners—I am forwarding this email as a procedural matter, and not in any way as a comment on the merits of any allegations in the email. We have informed Mr. Aryai that we intend to rely on the results of any investigation of the matters that he indicated he had referred to the United States Department of Justice Public Integrity Section, the Federal Bureau of Investigation and a "local" United States Attorney. We will, of course, cooperate fully should any such investigation be undertaken.

Pat

From: Brian Aryai [mailto:baryai@icongroupusa.com]
Sent: Monday, October 21, 2013 3:29 PM
To: Foye, Patrick
Cc: rsadowski@sflawgroup.com
Subject: Important - Criminal Complaint - The Port Authority of New York & New Jersey
Importance: High

Dear Mr. Foye:

It has become unquestionably clear to me that there are criminal elements within the Port Authority of New York & New Jersey ("PANYNJ") who are intent on keeping our firm, Icon Compliance Services, LLC ("ICS"), and specifically myself, far away from your agency's books and records. It also has come to my attention that whatever submissions or proposals we put forth to do business with the PANYNJ inexplicably vanish and we receive no consideration or responses. This paper will clearly demonstrate the multiple indicia of criminal activity that my firm and I are victims of. I, therefore, request an investigation by you to be carried out by an independent party external to the PANYNJ. Concomitant with this complaint, I am filing separate and formal criminal complaints with the United States Department of Justice Public Integrity Section and the Federal Bureau of Investigation alleging public corruption charges based on my firm's experience with your agency. I am also formally notifying a local United States Attorney about the unmistakable indicia of criminality that has come to our attention.

On October 15, 2013, after checking the PANYNJ's official website, I fortuitously became aware of Mr. Basil Paterson's appointment to your Board of Commissioners in June of 2013. Astoundingly, no one, including former Governor Paterson, had previously informed me about the aforesaid appointment. I will leave it to federal law enforcement to determine the circumstances and the true motivation leading to Mr. Basil Paterson's appointment to the board, when one considers that his own son had an impending earlier application for certification for a minority owned business with your agency, as well as the existence of several bids submitted to PANYNJ by ICS that were pending from months earlier. It is also quite shocking to me that, apparently, no one from your agency raised a red flag that there was a conflict concerning the impending matters referenced above when the appointment was implemented and announced. Former Governor Paterson's role in ICS was known both to you and Mr. Moerdler long before the appointment of Mr. Basil Paterson. Given the structure of our organization and the emerging conflict of interest which I discovered from this surprisingly unexpected appointment, affecting our impending bids with the PANYNJ, I immediately communicated with former Governor Paterson's assistant regarding my discovery and requested Mr. Paterson's resignation. In turn, former Governor Paterson formally tendered his resignation from ICS on October 16 and relinquished all interest and equity in the firm.

As you are aware, I have been credited, publicly, for the discovery, investigation and presentation for prosecution of the largest fraud scheme on record in the construction industry. When we met approximately a year ago, I offered to provide my unique insight and experience to assist the PANYNJ in uncovering construction fraud at the agency, you were receptive and agreed to contact Mr. Robert E. Van Etten, PANYNJ's Inspector General to schedule a meeting, so that my firm could offer its services to the PANYNJ.

Unfortunately, I happen to know Mr. Van Etten extremely well from my service as a United States Treasury/Customs Service special agent for fourteen years, where cronyism, corruption and blatant discrimination was quite commonplace while he occupied the position of Special Agent in Charge at the New York Office. Mr. Van Etten migrated to the PANYNJ with an assemblage of former cronies from the U.S. Customs Service not particularly known for investigative brilliance. In fact neither Mr. Van Etten nor Mr. Michael Nestor, his Director of Investigations at the PANYNJ, are known for any criminal investigative accomplishment as case agents while at the U.S, Customs Service. I would be extremely surprised if a federal criminal complaint could be found by either of these individuals, as case agents, in a substantial criminal investigation.

Mr. Van Etten is exceptionally adroit at taking credit for the hard work of others. Ironically, I have witnessed this behavioral trait of his, at my own expense, throughout my career. To cite a clear example, I have attached Mr. Van Etten's cosmetically profound, yet hollow and meaningless, comments (Exhibit A) at the press conference marking the announcement of the case that was entirely sourced due to my efforts and diligence. It is readily noticeable from Mr. Van Etten's comments that he did not even mention my hard work and effort, while I sacrificed my personal familial life and safety, was ever broached as he pounded his chest on the podium in yet another coveted press conference. Consistent with his history of building empires within a carefully designed public relations apparatus, once again, Mr. Van Etten hijacked credit for the work of others. I experienced the untenably deplorable and unethical misconduct by Mr. Van Etten both at the U.S. Customs Service and again as a senior construction executive, as evidenced by the press release I have attached. After years of literally watching my back and having exposed what was and continues to remain unprecedented in the history of rampant construction corruption in the New York metropolitan area, I felt deeply betrayed. As a child, I successfully escaped Iran where Islamist radicals intent on discriminating against me murdered my family members. As a federal agent I effectively survived shootouts with violent criminals. However, apparently, I cannot shake off staying in Mr. Van Etten's crosshairs.

When you suggested that I meet with Mr. Van Etten to offer our firm's services, I overlooked my horrid experience with him, as a U. S. Customs Service special agent and again as a construction executive, and attempted to turn a new page. However, leopards do not change their spots. Mr. Van Etten, in a letter authored by his assistant, declined to meet with my firm due to a falsely asserted fear of "an appearance issue".

I have attached Mr. Van Etten's assistant's email to Mr. Dallek, my associate, herewith (Exhibit B). The email is dated April 8, 2013. I urge you to consider how often Mr. Van Etten has personally met with favored contractors, including Toby Thacher of Thacher Associates, who has been granted monetarily significant contracts under Mr. Van Etten's direction and tenure. Evidently, your Inspector General adheres to a different set of rules for a firm that is technically superior, honest and fully independent.

Over several decades, the construction integrity monitoring and compliance contracting mechanism has become a fraud onto itself. I learned sobering insight from a ringside seat into this sham, while serving as Lend Lease's chief financial officer and controller of the New York office, when I managed $3 billion in annual revenues. When it comes to retaining a monitor, the construction industry has its "go to guys". It became clear to me, in the course of my tenure as a construction executive, that for most construction companies, the most favored "go to guy" is and continues to be Thacher Associates, for whom Mr. Van Etten and his acolytes have endless affinity. Numerous rankings by your Office of Inspector General of various bidders in past RFPs evidence this point, where Thacher Associates is hailed as a heroic figure in the industry and praised incessantly. These long favored monitors, who have entrenched themselves in the industry, in turn ensure that the monitoring goes "smoothly" and no scandals surface. This disgraceful condition is so blatant and evident that even the major national news media has learned about it and is conducting its own investigation. It also directly explains the ongoing chronic corruption that is never cured within the construction industry. Conversely, not so blessed are the monitoring and compliance contractors who are objective, independent and truthful in their reporting, which explains why reputable firms such as Doar Rieck Kaley and Mack LLP and our firm are left to pick up the scraps, if any, in this lucrative arena.

The corrupt mechanism for awarding these monitoring contracts is the single most significant cause for the perpetuity of rampant fraud and corruption within the construction industry, especially in the New York metropolitan area. It is my belief that there is abundant evidence, which sadly has escaped the attention of law enforcement, to bring criminal charges against these dishonest integrity monitors who absurdly lack integrity themselves. However doing so would involve an aggressive and thorough investigation, which would result in a much overdue cleansing of the construction industry and would identify criminal elements deeply rooted in public agencies, including the PANYNJ, who steer monitoring and compliance contracts to disreputable and corrupt monitors.

When I discovered and investigated the "gratis pay" or "8+2" fraud, it took me only one day to determine that the hours at the Deutche Bank demolition project at 130 Liberty Street was wholly afflicted with the fraud, which entailed openly adding fraudulent overtime hours to foremen's hours. As you are aware, this fraudulent scheme has now been described by many in the media as the largest fraudulent scheme in the construction industry. Thacher Associates was the contracted monitor at the Deutche Bank project site, funded by the LMDC, and billed substantial fees for monitoring services, which included numerous individuals from the firm who observed and investigated physical access to the job site and conducted audits of the payroll there. Yet, the inescapable presence of this fraud was never reported by Thacher Associates. When I inquired with Christopher Soleberry, my subordinate project accountant assigned to that project, he informed me that Thacher Associates was fully aware of the fraud and that in his discussions with Thacher Associates monitors, Mr. Soleberry was told the practice was pervasive throughout the industry for decades and, in essence, that is just the way things are. Additionally, Mr. James Abadie, the principal of Lend Lease, who pled guilty to charges arising from my investigation, on many occasions had battled with me, while we worked at the company, to cease my investigation and "let Toby take care of things"; I declined. Unfortunately, while even the news media has apparently sniffed out the existence of this obvious construction monitoring sham, these palpable conditions escaped the investigators and prosecutors so far. Interestingly, upon recognition of the extent of the fraud, in haste, shortly after the announcement by the United States Attorney, EDNY, of convictions and a deferred prosecution agreement resulting from my discovery and investigation, Thacher Associates was conveniently sold to K2 Intelligence. The timing for this sale was not coincidental. The time has come for a thorough investigation and cleansing of the corrupt elements in the industry and their associates who have infiltrated public agencies that ensure contracts are awarded to a select and corrupt few.

There have been multiple events in our quest to do business with the PANYNJ that inarguably have established the existence of a pattern of unlawful public corruption by internal criminal elements within your agency, who ostensibly have plans of their own for personal benefit. I am committed to the pursuit of justice to reverse these unacceptable conditions. I trust you will act in the same spirit. With that said, below is a factual chronology of events my firm has experienced in seeking to conduct business with the PANYNJ. These facts, I am certain, you will conclude are irrefutable evidence of a pattern of criminal activity committed by culpable subordinates of yours. I allege that these criminal activities represent blatant public corruption of the worst kind within your agency.

Furthermore, I strongly suspect that these criminal activities were planned and executed by elements within your agency's Office of Inspector General. As articulated in this communication, I will demonstrate to you in detail the basis of our gravamen and our justification for demanding an internal investigation <u>not to be carried out by your agency's Inspector General</u>. Below you will find a detailed and factual account of the relevant events in a chorological fashion:

I. <u>Formation of Icon Compliance Services, LLC, and our submission to the PANYNJ for certification as a minority owned business</u>

In October of 2012, former New York State Governor Paterson and I pooled our respective experiences together and founded Icon Compliance Services, LLC ("ICS"), to address the glaring and obvious absence of genuinely truthful integrity monitoring and compliance oversight over the construction industry. Our submission for certification as a minority owned business was hand delivered on April 11, 2013, to Ms. Cecilia A. Wallace at the PANYNJ, who had then informed me that the process would take no longer than four months, at a maximum, and that we would receive our certification "probably earlier than that" due to the fact that ownership of our firm was clearly observable by known and prominent individuals. I have attached our cover letter, authored by former Governor David A. Paterson for the referenced submission (Exhibit C). It is now well over six (6) months since our submission and our application has apparently disappeared into a dark hole. We were never contacted. In light of former Governor Paterson's resignation and dissociation with ICS, referenced earlier, I am hereby withdrawing this application. Nevertheless, I demand an explanation for the lack of acknowledgment and response by the PANYNJ regarding this application.

II. <u>Submission of our proposal for RFP # 32769</u>

We submitted our proposal for integrity monitoring services, by hand, for the above referenced project on April 22, 2013. There has been absolutely no communication back to us and we now are hearing, anecdotally, that the project was secretly awarded to Guidepost Solutions LLC. A search on the Internet disclosed that Freedom of Information of Act ("FOIA") requests were filed with the PANYNJ for the circumstances of this allegedly secret award that have been denied. I demand information on the status of this RFP including explanations of why we have not received any acknowledgment of our submission. If this project has been awarded, I demand to know why the PANYNJ has apparently elected not to follow the standard process which governs the decision. Furthermore, I demand to know why our firm was not considered for this award, if it has been completed. Our submission letter (Exhibit D) is attached for your review.

III. <u>Submission of our proposal for RFP # 33020</u>

We submitted our proposal, which contained unparalleled airport and law enforcement experience, for the performance of security audit services at the five major airports and the World Trade Center on May 29, 2013. The PANYNJ staff handling the proposal was actively engaged in discussions with our firm. Then, inexplicably and suddenly, all communications ceased and our efforts met total silence. The contract with the incumbent vendor has since been unaccountably extended. Our submission included a team of professionals that was far superior to the staff employed by the incumbent. The course of events leads us to believe that an internal element with the PANYNJ obstructed our ability to be considered for this bid. Our cover letter for the aforesaid submission (Exhibit E) is attached for your review.

IV. <u>Conclusion</u>

In conclusion, viewed reasonably and objectively, the events referenced above, taken in light of the totality of the circumstances, are clearly not accidental or coincidentally isolated matters. In my professional assessment, these unlawful acts were carefully planned, orchestrated and executed to deprive us from being equally considered to do business under the law. These criminally suspect actions are quite serious and require your immediate attention. Any meaningful investigation would require a thorough financial analysis, including net worth and expenditures methods, of personal finances of the senior employees of your Office of the Inspector General. We look forward to hearing from you in a timely fashion and expect that you will take appropriate and immediate corrective and disciplinary actions based on the facts I have provided herewith. We also would appreciate a formal and belated response to all of our impending submissions for projects in accordance to internal policies of the PANYNJ and applicable statutory requirements under the law.

Regards,

Brian S. Aryai, CPA, CFF, CIA, CFE
Chief Executive Officer
Icon Compliance Services, LLC
6 E 45th Street, Suite 901, New York, NY 10017 *(212) 758-8054
470 3rd Street South, Suite 512, St. Petersburg, FL 33701
baryai@icongroupusa.com

From: Plate, Steven <splate@panynj.gov>
Sent: Tuesday, September 10, 2013 8:08 PM
To: Samson, David; 'Vice Chair Rechler'; 'Commissioner Sartor '; 'Commissioner William 'Pat' Schuber
Cc: Danielides, Philippe
Subject: WTCC Daily Progress Report - Tuesday 9/10/2013
Attachments: 2013-09-10 WTCC Progress.pdf

Chair, Vice Chair, Commissioners,

Below is the daily progress report for Tuesday, September 10, 2013.

Steve

1WTC:

Other Activities:
- -Prepping to remove derrick
- -100th floor perimeter deck and fill
- -Tenant infills

Weather Impacts:
- -None

Hub:

Oculus:
- -Erected 1 transition arch
- -Surveyed upper portals, arch/transitions
- -Received delivery of two upper portals

Transit Hall:
- -Installed closure plates at beam penetrations
- -Sprayed intumescent paint on West Arch Truss
- -Prep, prime and paint East Stair and abutments

Memorial:

238 total workers
- -195 workers in the Museum
- -43 workers in the Pavilion

Pavilion:
- -Framed walls on the 2nd Floor
- -Installed caps at the Grand Staircase
- -3rd Floor waterproofing

Museum:
- -Installed supports for the North Overlook Hangers
- -Installed hangers and piping at the North East Quadrant
- -Patched on elevation 270' ribbon ramp

VSC:

-Placed 20 cubic yards of concrete for Stair E between 289'-305' and Stair D at 305' elevation
-Installed piping by Stair B on the 289' elevation
-Installed bollards along the ramp

Streets:

-Installed 4" conduit to the east side of the ECS Manhole on Vesey Street
-Installed pavers at radius on Greenwich Street and Liberty Street East
-Removed asphalt from road on Fulton Street

From:	Plate, Steven <splate@panynj.gov>
Sent:	Thursday, September 12, 2013 6:47 PM
To:	Samson, David; 'Vice Chair Rechler'; 'Commissioner Sartor · 'Commissioner William 'Pat' Schuber ·
Cc:	Danielides, Philippe
Subject:	WTCC Daily Progress Report - Thursday 9/12/2013
Attachments:	2013-09-12 WTCC Progress.pdf

Chair, Vice Chair, Commissioners,

Below is the daily progress report for Thursday, September 12, 2013.

Steve

1WTC:

Other Activities:

- -Prepping to remove derrick
- -100th floor perimeter deck and fill
- -Tenant shaft infills

Weather Impacts:

- -None

Hub:

Oculus:

- -Erected east abutment interior architectural shell
- -Surveyed upper portals, arch/transitions
- -Received delivery of six upper portals

Transit Hall:

- -Installed cover/splice plates between West Stair and West Box Girder 296'
- -Sprayed intumescent paint on West Arch Truss
- -Prep, prime and paint East Stair and abutments

Memorial:

238 total workers

- -195 workers in the Museum
- -43 workers in the Pavilion

Pavilion:

- -Framed walls on the 2nd Floor
- -Installed caps at the Grand Staircase
- -3rd Floor waterproofing

Museum:

- -Installed supports for the North Overlook Hangers
- -Installed hangers and piping at the North East Quadrant
- -Patched on elevation 270' ribbon ramp

VSC:

-Welding angles cover plates, and blast plates on Screening and Street Levels
-Installed pumps, covers, and piping on the 223 elevation
-Installed conduit on the 289 elevation

Streets:

-Installed light fixtures on the street poles on Liberty Street
-Installed pavers around tree pits on Greenwich Street East by T4
-Installed granite curb on south side of Fulton Street by T1

From: Plate, Steven <splate@panynj.gov>
Sent: Monday, September 16, 2013 7:26 PM
To: Samson, David; 'Vice Chair Rechler'; 'Commissioner Sartor ; 'Commissioner William 'Pat' Schuber
Cc: Danielides, Philippe
Subject: WTCC Daily Progress Report - Monday 9/16/2013
Attachments: 2013-09-16 WTCC Progress.pdf

Chair, Vice Chair, Commissioners,

Below is the daily progress report for Monday, September 16, 2013.

Steve

1WTC:

Other Activities:
- -Continued dismantling boom of derrick crane
- -Welded major diagonals/outriggers on the 93rd Floor
- -Tenant shaft infills

Weather Impacts:
- -None

Hub:

Oculus:
- -Erected west abutment
- -Surveyed upper portals, arch/transitions
- -Shook out delivered steel and removed trailers from site

Transit Hall:
- -Installed cover/splice plates between West Stair and West Box Girder 296'
- -Sprayed intumescent paint on West Eyebrow
- -Prep, prime and paint East Stair and abutments

Memorial:

239 total workers
- -200 workers in the Museum
- -39 workers in the Pavilion

Pavilion:
- -Installed ceiling panels on the first floor
- -Framed walls on the 2nd Floor
- -Welded steel for the canopy

Museum:
- -Installed sheetrock on elevation 284' by the Grand Staircase
- -Installed base in the Outer Gallery
- -Welded the North Overlook Hanger clips

VSC:

-Formed interior walls at the former hoist location on the 253 elevation
-Installed rebar and formed for the Helix inside shaft from the 305-331 elevations
-Formed North Canopy slab from column lines 19-24

Streets:

-Began demolition of the Deloitte wall along south Greenwich Street
-Poured 24 cubic yards of 5000 psi concrete for road base on the east side of south Greenwich Street
-Installed formwork and rebar for steam manhole footing at Vesey Street

From: Plate, Steven <splate@panynj.gov>
Sent: Wednesday, September 18, 2013 7:09 PM
To: Samson, David; 'Vice Chair Rechler'; 'Commissioner Sartor 'Commissioner William 'Pat' Schuber
Cc: Danielides, Philippe
Subject: WTCC Daily Progress Report - Wednesday 9/18/2013
Attachments: 2013-09-18 WTCC Progress.pdf

Chair, Vice Chair, Commissioners,

Below is the daily progress report for Wednesday, September 18, 2013.

Steve

1WTC:

Other Activities:
- -Continued to disassemble the Derrick Crane
- -100th floor perimeter deck and fill
- -Tenant shaft infills
- -Prepared to weld diagonals 93th floor

Weather Impacts:
- -None

Hub:

Oculus:
- -Erected 3 upper portals
- -Erected scaffolding at east/west sides
- -Surveyed upper portals, arches/transitions

Transit Hall:
- -Installed closure plates at beam penetrations
- -Installed and welded cover/spice paltes between west escalator and West Box Girder 296'
- -Prep, prime and sand tapers

Memorial:

232 total workers
- -187 workers in the Museum
- -45 workers in the Pavilion

Pavilion:
- -Installed ceiling panels on the first floor
- -Framed walls on the 2nd floor
- -Erected steel canopy

Museum:
- -Installed sheet rock on elevation 284'
- -Installed base in the Outer Gallery
- -Installed lights in the North Gallery

VSC:

-Placed 20 cubic yards for slab infills at the 253 elevation
-Formed interior walls at the former hoist location on the 253 elevation
-Formed North Canopy slab lines 19-24

Streets:

-Poured 20 cubic yards of 5000 psi concrete for road base on south Greenwich Street by 3C
-Poured 7 cubic yards of 5000 psi concrete for manholes at North Greenwich Street under PATH Station
-Installed mortar and caulking for finish paver on east Greenwich Street by T4

From:	Plate, Steven <splate@panynj.gov>
Sent:	Friday, September 20, 2013 6:13 PM
To:	Samson, David; 'Vice Chair Rechler'; 'Commissioner Sartor 'Commissioner William 'Pat' Schuber
Cc:	Danielides, Philippe
Subject:	WTCC Daily Progress Report - Friday 9/20/2013
Attachments:	2013-09-20 WTCC Progress.pdf

Chair, Vice Chair, Commissioners,

Below is the daily progress report for Friday, September 20, 2013.

Steve

1WTC:

Other Activities:
- -Removed derrick crane support steel
- -Welded diagonals on 93rd floor
- -Tenant Shaft infills

Weather Impacts:
- -None

Hub:

Oculus:
- -Erected 2 upper portals and 1 horizontal strut
- -Erected scaffolding at east/west sides
- -Surveyed upper portals, arches/transitions

Transit Hall:
- -Sprayed intumescent paint on cantilever north side beams
- -Installed and welded cover/spice paltes between west escalator and West Box Girder 296'
- -Prep, prime and sand tapers

Memorial:

231 total workers
- -189 workers in the Museum
- -42 workers in the Pavilion

Pavilion:
- -Installed ceiling panels on the 1st floor
- -Framed walls on the 2nd floor
- -Welded steel for the canopy

Museum:
- -Installed sheetrock on elevation 284' by the Grand Stair Case
- -Installed base in the Outer gallery
- -Installed lights in the North Gallery

VSC:

-Placed 20 cubic yards of concrete for Stair G beams at the 305 elevation
-Placed 20 cubic yards for sewer trench on Cedar Street
-Placed 60 cubic yards of concrete for the east exterior wall at the Helix at the 310 elevation

Streets:

-Continued demolition of the Deutsche Bank wall along south Greenwich Street
-Paved asphalt and painted marking on Greenwich Street
-Poured 55 cubic yards of 5000psi concrete road base on Fulton Street

Rechler, Scott

From: Rechler, Scott
Sent: Thursday, September 19, 2013 5:47 AM
To: David Garten
Subject: Re: disturbing

David -

I read this last evening and wanted to sleep on it before I responded to same. It is definitely disturbing. I think I need to have another conversation with him as well as with Joe or Larry. He needs to be a team player. If he is having a hard time with Pat, he should be coordinating with you. We can't afford to have one of our key team members not being totally in synch with us. It probably would make sense for you and me to sit with him together too.

The DW is getting worse. His power base seems to be expanding and his actions are getting more and more outrageous. We need to move quickly to expose him but we also need to make sure that our first shot is powerful because he is not going to go down easily. The last thing we want is for him to survive as a wounded / angry DW will be a disaster to the PA.

As an aside, why would DW plant the story in the WSJ?

Crazy world we live in.

Scott

Scott Rechler
CEO and Chairman
RXR Realty

On Sep 18, 2013, at 6:54 PM, "David Garten' wrote:

> Hey -
>
> I thought today was a good day overall - we got what we wanted (Red Hook and Recusal/Disclosure) and we didn't cause ourselves any harm. Moerdler was asleep, but we still have a bomb to use in the future (as well as another opportunity to bring it up in next week's Governance and Security meetings in NJ).
>
> I wanted to follow up on my conversation with you about Brian. Brian emailed me this afternoon asking if I was free to catch up. So he and I met around 4:45 (we didn't have long to talk because I had to catch a train to DC). He told me that DW called him last night about Fort Lee. DW told him that we planted the story in the WSJ and that all they (NJ) were doing was conducting their own independent study. DW told him that you told Baroni that the study can continue, but that Pat said the study and toll lane closures had to come to an end per Howard Glaser. Brian then started to tell me that he doesn't see Howard doing something like that, that we have to insulate the 2nd floor and that we can't name drop the 2nd floor like that. DW then asked Brian if the 2nd floor was getting involved in New Jersey politics 43 days before his governor's election. Brian said that he told DW that he didn't know anything about the Fort Lee incident, that he doesn't get involved in NJ politics and is only concerned about NY, but that he would look into it.
>

> First, I told Brian that as soon as he heard from DW about this, he should have informed me because you and I were dealing it last night and this morning. It's clear that Brian hadn't read any of the clips on the issue so I then told him the background of the Fort Lee incident - someone from the NJ side called up TB&T and told them to shut down 2 of the 3 toll lanes and not tell the ED, Media, the Mayor, the Fort Lee PD, etc. So for four days, the toll lanes were closed causing two - three hour traffic jams. I said Pat learned about it in the media preview on Thursday night, asked TB&T about it and had the lanes restored Friday morning. I told Brian that there is no study. Brian appeared taken back and he repeated that he didn't know any of this. I told him to continue to act like he doesn't know anything with NJ, but to keep me informed ASAP the next time something like this happens - regardless of the time of day.
>
> Brian then brought up his relationship with Pat. He said that Pat treats him differently than everyone else on the NY side and he wanted to know if I knew why. I let him know that for some reason Pat just clashes with Brian, but we have to figure out a way to work around it to get things done and that he should continue working with me and Lisa. However, Brian said that he should not be expected to change the way he is for Pat and that he gets along great with the 2nd floor and that has open access to everyone over there (he mentioned Larry, Howard, and Joe). I told him that I will think about it some more, but we need to figure out a way to make it work.
>
> Brian and Pat are meeting tomorrow at 1pm. Brian requested the meeting. We have to make sure Pat doesn't blow up or make things worse so I can call Pat tomorrow morning, but it would be a good idea for you to also to urge Pat to proceed with caution (on a side note - Pat is on a mission to tell Joe about Brian). More importantly, we have to figure how to deal with this situation - you've talked to him, Lisa has talked to him, and I've talked to him. I'm pretty sure that Brian has more conversations with DW than he does with me or Pat. The NJ side knows he's weak and he's not in the loop and they use him to plant seeds against us. The fact that Brian's reaction in response to DW's telling of Fort Lee was that Pat was hurting the 2nd floor is case in point. And unfortunately this is just a common theme - Brian recently told me that DW came to him about the social media habits of Redacted and that it was a problem for our Governor - Brian took the bait. While Brian said that he would talk with Lisa, he sided with DW that what Redacted was doing could be harmful to the Governor.
>
> I don't know what we gain by having Brian talk to DW - he doesn't tell us when he does talk to him and DW just plants seeds with Brian that work against us. The NJ side knows that he doesn't share info with us so they tell him things in order to say that they "informed" the NY side. Brian takes the info that the NJ side gives him and unwittingly runs with it.
>
> I'm at a loss on how to handle. It would be one thing if these were small, insignificant items, but they're not. And he's the Director of Government Affairs for the NY side so he has a big job. I hate to add this to this on things we have to deal with, but what he told me today regarding his conversation with DW makes me think we have to act on this somehow soon.
>
> Will get you the other things you're looking for and I'm sure we'll be talking more later.
>
> David

Rechler, Scott

From: David Garten
Sent: Thursday, December 05, 2013 11:06 AM
To: Rechler, Scott
Subject: Potential TPs - let me know what you think

These TPs need to be phrased a little better, but what do you think of Pat hitting the following in his testimony. I'm also working on potential TPs to questions:

I have a great working relationship with my colleague and friend, Bill Baroni.

Governor Cuomo and Governor Christie have a great working relationship and equally committed to the shared goal of a well-run, efficient Port Authority that both states deserve. [This will require approval from the 2nd floor, but I would love for Pat to say some version of this - it would put Christie in a very difficult spot with national GOP].

Tout the accomplishments of the PA since both Governors took over - reform, accomplishments, and what's on the horizon in the coming months - investing in the region with the capital plan and continued reform.

What occurred the week of September 9th at the GWB was appalling and is not the way that the PA conducts business. When I learned of the closures, I did X, Y, and Z.

For some inexplicable reason, Mr. Wildstein ordered a traffic study that included the closures of two of the three toll lanes that provide access to X yearly cars and trucks to the world's busiest crossing.

Every year the Port Authority conducts X number of traffic studies and we have never conducted any of these studies in the manner that occurred on September 9th.

When the PA conducts a traffic study, this is what we do...it does not and has never involved the actual closing of lanes. In the event that we do have to close lanes at any of our crossings, the PA's stated policy is to X, Y, and Z.

In my review of the incident, which is still ongoing, I have learned that Mr. Wildstein did more than just fail to communicate - in addition to making the decision to close the toll late without informing me, the PA Board, and the Fort Lee community, ignoring long standing PA Policy and Procedures, I have learned that Mr. Wildstein called Bob Durando, an X year career employee of the PA and general manager of the GWB, and Cedric Fulton, an X year career employee and the Director of the PA's Bridges and Tunnels Department, to not only close the two toll lanes, but to not tell anybody of the action. This was not a failure to communicate, but a direct action on the part of Mr. Wildstein to silence PA employees about doing something that they have never been asked to do.

The efficient flow of traffic at all of our crossings is very important. In light of the concern that the Fort Lee toll lanes play a role in disrupting the flow of traffic at the GWB, working with the Deputy Executive Director we will direct the X department to review not only the GWB, but all of our crossings to report to our Board how traffic flow can be improved. [Let me know what you think of this - it addresses Christie's statements that this needs to be looked at. So we throw them a bone, while still directing the fire at DW]

PA - GWB - 008164

Rechler, Scott

From: Rechler, Scott
Sent: Thursday, December 05, 2013 4:05 PM
To: 'David Garten'
Subject: RE: Potential TPs - let me know what you think

By the way, I would try to soften this a bit if we end up having to go through with it.

From: David Garten
Sent: Thursday, December 05, 2013 11:06 AM
To: Rechler, Scott
Subject: Potential TPs - let me know what you think

These TPs need to be phrased a little better, but what do you think of Pat hitting the following in his testimony. I'm also working on potential TPs to questions:

I have a great working relationship with my colleague and friend, Bill Baroni.

Governor Cuomo and Governor Christie have a great working relationship and equally committed to the shared goal of a well-run, efficient Port Authority that both states deserve. [This will require approval from the 2nd floor, but I would love for Pat to say some version of this - it would put Christie in a very difficult spot with national GOP].

Tout the accomplishments of the PA since both Governors took over - reform, accomplishments, and what's on the horizon in the coming months - investing in the region with the capital plan and continued reform.

What occurred the week of September 9th at the GWB was appalling and is not the way that the PA conducts business. When I learned of the closures, I did X, Y, and Z.

For some inexplicable reason, Mr. Wildstein ordered a traffic study that included the closures of two of the three toll lanes that provide access to X yearly cars and trucks to the world's busiest crossing.

Every year the Port Authority conducts X number of traffic studies and we have never conducted any of these studies in the manner that occurred on September 9th.

When the PA conducts a traffic study, this is what we do...it does not and has never involved the actual closing of lanes. In the event that we do have to close lanes at any of our crossings, the PA's stated policy is to X, Y, and Z.

In my review of the incident, which is still ongoing, I have learned that Mr. Wildstein did more than just fail to communicate - in addition to making the decision to close the toll late without informing me, the PA Board, and the Fort Lee community, ignoring long standing PA Policy and Procedures, I have learned that Mr. Wildstein called Bob Durando, an X year career employee of the PA and general manager of the GWB, and Cedric Fulton, an X year career employee and the Director of the PA's Bridges and Tunnels Department, to not only close the two toll lanes, but to not tell anybody of the action. This was not a failure to communicate, but a direct action on the part of Mr. Wildstein to silence PA employees about doing something that they have never been asked to do.

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Rechler, Scott

From: Rechler, Scott
Sent: Tuesday, December 17, 2013 10:03 PM
To: 'David Garten'
Subject: RE: Subpoenaed Document Review

Thanks ... this is helpful.

From: David Garten
Sent: Tuesday, December 17, 2013 9:43 PM
To: Rechler, Scott
Subject: Subpoenaed Document Review

I went through Baroni's emails as well as some of the emails that I have. I should get Wildstein's emails tomorrow, as well as other materials. But below are a few things that caught my eye from Baroni's emails and some of my emails:

Exchange with me, you, Pat, Lisa and John

Red Flag: On the exchange where you emailed the following to me, Pat, Lisa, and John, "Good outcome. Now I can go to temple with a clean conscious!". This was in response to Pat's email stating that the lanes are open and that media will issue the statement about a study on traffic safety patterns.

Why it shouldn't be a problem: Earlier in the day you emailed the following to Patrick, Cedric, Durando, Baroni, Dunne, Samson, and Darrell: This is terribly disturbing and incomprehensible to me. How can a decision like this be made without it being discussed and considered at the highest level? I am particularly disturbed that this was occurring without regard to this being the Jewish high holiday weekend. Pat, please let us know what happened.

Email between you and Baroni

Bill forwards the media statement to just you. He includes in the statement, "Mr. Vice Chairman, Pat and I discussed and he was okay with the below statement." You responded with, "I am glad. Thanks for the follow."

Email between me and Baroni

Bill forwards the media statement to just me.

Back and forth email exchange between you and Samson as to whether Pat leaked his email to the WSJ

9/18/13 at 5:54am: David - you know I am not naive to these issues but in this instance I don't agree with your assessment of Pat's involvement. Perhaps you or Bill have some different intelligence than mine that will change that view. Ted Mann is a good reporter and was instructed to sniff out this story by his editors who were stuck in traffic. Pat's initial email is out there and sent because of our belief that the PA staff was running amuck (due to our lack of any other knowledge) and likely led to the reference in the article. Let's not escalate this unless there is clear evidence that he truly spoke to the WSJ.

Pat deferring to Bill in several emails to the press shop on statements to the press or whether any response should be given on GWB inquiries

When reading these emails, it can seem odd that Pat as the ED defers to Bill on the PA's public statements on such a major issue.

Big Red Flag - Potential Smoking Gun

In addition to intimidating Durando and Cedric (and taking websites out on me, you and Pat), Wildstein may have bullied Baroni as well. On September 9th, Baroni's office received an urgent phone call from the Mayor of Fort Lee. The email message to Baroni from his assistant stated this in the subject line: Re: Phone Call: Mayor Sokolich 201-224-4000 re: urgent matter of public safety in Fort Lee.

Baroni forward this email to Wildstein. Wildstein replied from his personal account to Baroni simply with: radio silence

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Rechler, Scott

From: Rechler, Scott
Sent: Thursday, December 05, 2013 9:59 AM
To: 'David Garten'
Subject: RE: just in case you didn't see this in the clips

OK. I have an idea that I am bouncing by Steve Cohen too.

From: David Garten
Sent: Thursday, December 05, 2013 9:58 AM
To: Rechler, Scott
Subject: Re: just in case you didn't see this in the clips

Good.

I have some ideas for TPs for pat that I want to run past you.

Sent from my iPhone

On Dec 5, 2013, at 9:56 AM, "Rechler, Scott" wrote:

> Nervous.
>
> ---
>
> **From:** David Garten
> **Sent:** Thursday, December 05, 2013 9:55 AM
> **To:** Rechler, Scott
> **Subject:** Re: just in case you didn't see this in the clips
>
> Samson mad?
>
> I spoke with Pat and Lisa. We're all on the same page for Monday. Lisa said that Howard and Larry told Pat the same thing the governor told you.
>
> Sent from my iPhone
>
> On Dec 5, 2013, at 9:26 AM, "Rechler, Scott" > wrote:
>
> > Saw it and already heard from Samson about it.
> >
> > Scott Rechler
> > CEO and Chairman
> > RXR Realty
> >
> > On Dec 5, 2013, at 8:37 AM, "David Garten" > wrote:

Port Authority official from N.Y. to testify in controversy over lane closures at George Washington Bridge

WEDNESDAY, DECEMBER 4, 2013 LAST UPDATED: WEDNESDAY DECEMBER 4, 2013, 11:26 PM
BY SHAWN BOBURG
STAFF WRITER
THE RECORD
PRINT | E-MAIL

A top Port Authority executive from New York who privately described mysterious lane closures on the George Washington Bridge as "abusive" — and maybe even illegal — said Wednesday he plans to testify next week before New Jersey lawmakers looking into whether the world's busiest bridge was turned into a political weapon.

Monday's planned testimony by Pat Foye, New York Gov. Andrew Cuomo's top appointee at the bi-state agency, threatens to open the first public rift between Governor Christie and Cuomo, rising stars in their respective parties who have made efforts to appear friendly. But the growing controversy — and the conflicting stories by each governor's representative at the agency — seem to have put them on a collision course.

Christie's appointees have described the surprise lane closures, which caused three-hour traffic jams in September in Fort Lee, as a simple traffic study. But an internal email written by Foye has fueled speculation by Democrats that the study, quietly ordered by a top Christie appointee without any notice to the public or agency traffic experts, was payback against Fort Lee's mayor — a Democrat who did not endorse the governor in his campaign for reelection.

Related: Port Authority exec subpoenaed over GWB gridlock

On Wednesday, at the agency's monthly meeting in Manhattan, Foye said for the first time that he stood by the leaked email, in which he alleged that agency protocol was "wrongfully subverted" and that state and federal laws may have been broken. His comments Wednesday were brief, only serving to confirm his plans to testify and making reference to the Sept. 13 email. But they indicated a deep dispute that extends to Trenton and Albany.

Top executives at the agency rarely make significant announcements or comment on sensitive matters without getting approval from advisers close to each governor. A spokesman for Christie did not respond to a request for comment on Wednesday.

Standing next to Foye at the lectern was Christie's top executive, Bill Baroni, who declined to respond to his counterpart's comments during the press conference that typically follows the agency's monthly meetings. Baroni repeatedly said he had already given extensive testimony last week in a combative hearing before the state Assembly Transportation Committee in Trenton.

Foye declined an invitation to appear that day. However, the Transportation Committee issued a subpoena last week compelling him to appear on Monday. It's unclear if the subpoena power claimed by the New Jersey lawmakers applies to New York public officials. Foye did not say whether he believed he was legally compelled to go to Trenton.

A central figure in the controversy was not at the press conference: David Wildstein, a former political consultant who went to high school with Christie and wields enormous power as the agency's director of interstate capital projects. It was Wildstein who ordered the lane closures after the president of the Port Authority police union raised concerns about traffic, Baroni told the Assembly panel last week. The 1,300-member union endorsed Christie, and its president, Paul Nunziato, works closely with Wildstein.

Nunziato, who attended Wednesday's meeting, said he mentioned his concern to Wildstein "over breakfast," during one of the "hundreds" of conversations they have had about everything from public safety to traffic to police staffing levels. He was asked why the agency's traffic engineers were evidently not involved in, or informed about, the study.

"They [expletive] up everything," he said. "Do I know more than a traffic engineer? Do my guys know more? Yeah, probably, because we stand out there all day."

Nunziato called Foye's email "a load of garbage," suggesting it was an effort to undermine New Jersey's influence within the agency, which doles out cash for major public works projects on both sides of the Hudson River. The agency is currently deciding what projects it will undertake over the next 10 years, a process that often heightens interstate tensions.

"It's like the Sharks and the Jets here," Nunziato said about New York and New Jersey, a reference to rival street gangs in the musical "West Side Story."

Nunziato's union gave Christie an early endorsement last year — in January, when he stood next to the governor and said: "I know that I don't have to worry when Chris Christie says he has our back; he has been there every time."

Christie's decision to support keeping Port Authority police at the World Trade Center instead of ceding those jobs to New York City police was popular with the powerful union.

In his testimony last week, after months of silence, Baroni said the traffic study was meant to determine whether Fort Lee deserved three access lanes to tollbooths from local roads. He suggested it was an unfair allocation that slowed down traffic for the rest of New Jersey's drivers heading east across the bridge. The proportion of lanes dedicated to the Fort Lee traffic, he said, was much higher than the percentage of bridge traffic that originates in the borough.

Senate Majority Leader Loretta Weinberg, a Democrat from Teaneck, said Wednesday that analysis was flawed because drivers from throughout Bergen County and Hudson County use those access lanes.

"These lanes are not limited to the exclusive use of Fort Lee residents," she said, during her fourth appearance at a commissioners meeting since September to ask for answers to unresolved questions. "Leaving that impression was completely inappropriate."

Baroni's testimony about the traffic study also failed to satisfy Assemblyman Gordon M. Johnson, D-Englewood, who spoke at the meeting, too.

"He talked about a traffic study and fairness," he said of Baroni. "He should have began his testimony with 'Once upon a time' because it was a fairy tale."

Email: boburg@northjersey.com

- See more at:
http://www.northjersey.com/news/Port_Authority_police_union_wades_into_GWB_lane_closure_tiff.html?page=all#sthash.vMxI5oyA.dpuf

Rechler, Scott

From: Rechler, Scott
Sent: Friday, December 06, 2013 7:56 PM
To: David Garten
Subject: FW: Fwd:

I wonder what this means ...

-----Original Message-
From: Samson, David
Sent: Friday, December 06, 2013 6:53 PM
To: Rechler, Scott
Subject: Re: Fwd:

Sure. After Monday, I'm afraid we are going to have to have a very serious conversation about going forward.in the meantime., enjoy your weekend. David.

Sent from my iPhone

On Dec 6, 2013, at 6:46 PM, "Rechler, Scott" wrote:

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>
> Scott Rechler
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>> On Dec 6, 2013, at 5:21 PM, "Samson, David" wrote:
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>> Port Authority official resigns amid GWB lane closure controversy
>> Friday, December 6, 2013 Last updated: Friday December 6, 2013, 5:08 PM
>> BY SHAWN
>> BOBURG<http://www.northjersey.com/authors/?name=SHAWN%20BOBURG>
>> STAFF WRITER
>> The Record
>> Print<javascript:;> | E-mail<javascript:;>
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>> [David Wildstein, appointed by Governor Christie as director of
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>> Jersey, appearing at a meeting Feb. 9,
>> 2012.]<http://media.northjersey.com/images/0304A_WildsteinJump70p.jpg
>> >
>> KEVIN R. WEXLER/STAFF PHOTOGRAPHER

>> David Wildstein, appointed by Governor Christie as director of Interstate Capital Projects at the Port Authority of New York and New Jersey, appearing at a meeting Feb. 9, 2012.
>> [On Sept. 12, cars were backed up at the tolls because the approach
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>> right.]<http://media.northjersey.com/images/11222013_tolls_DNGCM.jpg>
>> AMY NEWMAN/STAFF PHOTOGRAPHER
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>>
>> David Wildstein, the agency's director of Interstate Capital Projects, submitted his resignation letter Friday, days before a legislative hearing to investigate the lane closures. Wildstein said he plans to leave on Jan. 1 "to pursue other opportunities."
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>> "My plan was to leave the agency at some point next year, but the Fort Lee<http://www.northjersey.com/fortlee> issue has been a distraction, and I think it's better to move on earlier," he wrote in a letter to the agency's Deputy Executive Director, Bill Baroni. "I am grateful to you and Governor Christie<http://www.northjersey.com/news/state/governor/> for the opportunity to serve."
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>> News of Wildstein's resignation came on the same day two more Port Authority officials were ordered to testify before New Jersey lawmakers on Monday about the unannounced lane closures in September.
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>> The legislative panel sent subpoenas to Cedric Fulton, the Port Authority's director of tunnels, bridges and terminals, and Robert Durando, the manager of the Fort Lee<http://www.northjersey.com/fortlee> bridge, ordering them to appear before a committee investigating whether the lane closures were politically motivated to punish Fort Lee<http://www.northjersey.com/fortlee>'s mayor.
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>> A spokesman for Democratic Assemblyman John Wisniewski, chairman of the transportion committee, confirmed on Friday afternoon that both officials were summoned to Trenton to testify Monday. It's not clear if the officials intend to comply; a Port Authority spokesman did not immediately respond to a request for comment.
>> Wildstein would not comment beyond announcing his resignation.
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>> The hearing threatens to expose divisions within the bi-state agency between governors on both sides of the Hudson. The lane closures, which caused heavy traffic delays in Fort Lee<http://www.northjersey.com/fortlee>, were ordered by Wildstein without notification to the public, local officials, or the agency's executive director.
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>> The executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, has said he intends to testify after he received a subpoena last week.
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>> Foye called the closures "abusive" and said they were potentially illegal in an internal e-mail that was leaked to the media. Earlier this week, while saying he intended to testify, he said he stands by the e-mail. The Fort Lee<http://www.northjersey.com/fortlee> Mayor, Mark Sokolich, initially said he believed the closures were "punitive" but has since backed away from that statement. Sokolich, a Democrat, was asked to endorse Christie for re-election in September but declined.
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>> Christie previously called the notion that it was political retribution "crazy." His top appointee at the agency, Bill Baroni, testified before the same panel last week and said the lane closures were part of a simple traffic study to determine whether too many toll lanes are dedicated to traffic from a local access ramp.
>>
>> Closing two of the three lanes dedicated to traffic from the local ramp reduced wait times for other traffic, he said. But an internal e-mail written by Foye has led to speculation that the lane closures were something more sinister. Foye said he was not notified about the lane closures in advance; and he reversed them after finding out about them.
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>> Former Port Authority officials interviewed have also said that such decisions on a major facility are typically preceded by several meetings with police, traffic engineers and other agency officials. In this case, Baroni testified, the idea came from the president of the Port Authority police union. It was then ordered by Wildstein, a former political consultant who went to high school with Christie. Wildstein has the title of director of Interstate Capital Projects but wields enormous power and has been described as the Christie administration's eyes and ears within the agency.
>> - See more at:
>> http://www.northjersey.com/news/More_Port_Authority_officials_ordered
>> _to_testify_on_GWB_lane_closures.html#sthash.MkddWpBk.dpuf
>>
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>> ***
>> * Please Note: The information contained in this email message is a
>> PRIVATE communication that may contain confidential attorney-client information. If you are not the intended recipient, do not read, copy or use it or disclose it to others. If you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.
>> Thank you.
>> ***
>> * IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements
>> imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
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>> <image002.jpg>

Rechler, Scott

From: Rechler, Scott
Sent: Friday, December 06, 2013 7:48 PM
To: Samson, David
Subject: RE: Fwd:

Enjoy your weekend too! Speak to you Monday. Scott

-----Original Message-----
From: Samson, David
Sent: Friday, December 06, 2013 6:53 PM
To: Rechler, Scott
Subject: Re: Fwd:

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>> - See more at:
>> http://www.northjersey.com/news/More_Port_Authority_officials_ordered
>> _to_testify_on_GWB_lane_closures.html#sthash.MkddWpBk.dpuf
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>> **
>> * Please Note: The information contained in this email message is a
>> PRIVATE communication that may contain confidential attorney-client information. If you are not the intended recipient, do not read, copy or use it or disclose it to others. If you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.
>> Thank you.
>> **
>> * IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements
>> imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
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> RXR Realty

>
>> On Dec 6, 2013, at 5:21 PM, "Samson, David wrote:
>>
>>
>>
>> Port Authority official resigns amid GWB lane closure controversy
>> Friday, December 6, 2013 Last updated: Friday December 6, 2013, 5:08 PM
>> BY SHAWN
>> BOBURG<http://www.northjersey.com/authors/?name=SHAWN%20BOBURG>
>> STAFF WRITER
>> The Record
>> Print<javascript:;> | E-mail<javascript:;>
>>
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>> [David Wildstein, appointed by Governor Christie as director of
>> Interstate Capital Projects at the Port Authority of New York and New
>> Jersey, appearing at a meeting Feb. 9,
>> 2012.]<http://media.northjersey.com/images/0304A_WildsteinJump70p.jpg
>> >
>> KEVIN R. WEXLER/STAFF PHOTOGRAPHER
>> David Wildstein, appointed by Governor Christie as director of Interstate Capital Projects at the Port Authority of New York and New Jersey, appearing at a meeting Feb. 9, 2012.
>> [On Sept. 12, cars were backed up at the tolls because the approach
>> to the tolls has been narrowed to one toll, seen on far
>> right.]<http://media.northjersey.com/images/11222013_tolls_DNGCM.jpg>
>> AMY NEWMAN/STAFF PHOTOGRAPHER
>> On Sept. 12, cars were backed up at the tolls because the approach to the tolls has been narrowed to one toll, seen on far right.
>>

>> David Wildstein, the agency's director of Interstate Capital Projects, submitted his resignation letter Friday, days before a legislative hearing to investigate the lane closures. Wildstein said he plans to leave on Jan. 1 "to pursue other opportunities."
>>
>> "My plan was to leave the agency at some point next year, but the Fort Lee<http://www.northjersey.com/fortlee> issue has been a distraction, and I think it's better to move on earlier," he wrote in a letter to the agency's Deputy Executive Director, Bill Baroni. "I am grateful to you and Governor Christie<http://www.northjersey.com/news/state/governor/> for the opportunity to serve."
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>> News of Wildstein's resignation came on the same day two more Port Authority officials were ordered to testify before New Jersey lawmakers on Monday about the unannounced lane closures in September.
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>> The legislative panel sent subpoenas to Cedric Fulton, the Port Authority's director of tunnels, bridges and terminals, and Robert Durando, the manager of the Fort Lee<http://www.northjersey.com/fortlee> bridge, ordering them to appear before a committee investigating whether the lane closures were politically motivated to punish Fort Lee<http://www.northjersey.com/fortlee>'s mayor.
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>> A spokesman for Democratic Assemblyman John Wisniewski, chairman of the transportion committee, confirmed on Friday afternoon that both officials were summoned to Trenton to testify Monday. It's not clear if the officials intend to comply; a Port Authority spokesman did not immediately respond to a request for comment.
>> Wildstein would not comment beyond announcing his resignation.
>>
>> The hearing threatens to expose divisions within the bi-state agency between governors on both sides of the Hudson. The lane closures, which caused heavy traffic delays in Fort Lee<http://www.northjersey.com/fortlee>, were ordered by Wildstein without notification to the public, local officials, or the agency's executive director.
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>> The executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, has said he intends to testify after he received a subpoena last week.
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>> Foye called the closures "abusive" and said they were potentially illegal in an internal e-mail that was leaked to the media. Earlier this week, while saying he intended to testify, he said he stands by the e-mail. The Fort Lee<http://www.northjersey.com/fortlee> Mayor, Mark Sokolich, initially said he believed the closures were "punitive" but has since backed away from that statement. Sokolich, a Democrat, was asked to endorse Christie for re-election in September but declined.
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>> Former Port Authority officials interviewed have also said that such decisions on a major facility are typically preceded by several meetings with police, traffic engineers and other agency officials. In this case, Baroni testified, the idea came from the president of the Port Authority police union. It was then ordered by Wildstein, a former political consultant who went to high school with Christie. Wildstein has the title of director of Interstate Capital Projects but wields enormous power and has been described as the Christie administration's eyes and ears within the agency.
>> - See more at:
>> http://www.northjersey.com/news/More_Port_Authority_officials_ordered
>> _to_testify_on_GWB_lane_closures.html#sthash.MkddWpBk.dpuf
>>

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>> **
>> * Please Note: The information contained in this email message is a
>> PRIVATE communication that may contain confidential attorney-client information. If you are not the intended recipient, do not read, copy or use it or disclose it to others. If you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.
>> Thank you.
>> **
>> * IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements
>> imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
>> **
>> *
>>
>> <image001.jpg>
>> <image002.jpg>

Rechler, Scott

From: Rechler, Scott
Sent: Friday, December 06, 2013 8:54 PM
To: 'David Garten'
Subject: RE: FW: Fwd:

That's what I was thinking. Never a dull moment!

-----Original Message
From: David Garten
Sent: Friday, December 06, 2013 8:30 PM
To: Rechler, Scott
Subject: Re: FW: Fwd:

My guess - they are going to make a move on Pat.

Sent from my iPhone

> On Dec 6, 2013, at 7:55 PM, "Rechler, Scott" wrote:
>
> I wonder what this means ...
>
> -----Original Message-
> From: Samson, David
> Sent: Friday, December 06, 2013 6:53 PM
> To: Rechler, Scott
> Subject: Re: Fwd:
>
> Sure. After Monday, I'm afraid we are going to have to have a very serious conversation about going forward.in the meantime., enjoy your weekend. David.
>
> Sent from my iPhone
>
>> On Dec 6, 2013, at 6:46 PM, "Rechler, Scott" wrote:
>>
>> Thanks for forwarding.
>>
>> Scott Rechler
>> CEO and Chairman
>> RXR Realty
>>
>>
>>> On Dec 6, 2013, at 5:21 PM, "Samson, David" wrote:
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>>> BY SHAWN

>>> BOBURG<http://www.northjersey.com/authors/?name=SHAWN%20BOBURG>
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>>> d _to_testify_on_GWB_lane_closures.html#sthash.MkddWpBk.dpuf
>>>
>>>
>>>
>>>
>>> **
>>> *
>>> * Please Note: The information contained in this email message is a
>>> PRIVATE communication that may contain confidential attorney-client information. If you are not the intended recipient, do not read, copy or use it or disclose it to others. If you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.
>>> Thank you.
>>> **
>>> *
>>> * IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with
>>> requirements imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
>>> **
>>> *
>>> *
>>>
>>> <image001.jpg>
>>> <image002.jpg>

Rechler, Scott

From: Rechler, Scott
Sent: Wednesday, September 18, 2013 6:30 AM
To: David Garten
Cc: lisamacdc
Subject: Re: WSJ

I saw that ... already have had a series of back and forths with Samson on this. Unless they have some concrete intel I am going to take a hard line. I wonder if their insights tie back into DW's phones.

Scott Rechler
CEO and Chairman
RXR Realty

On Sep 18, 2013, at 6:26 AM, "David Garten" wrote:

> Just to point out - Ted has the wrong day as to when the lanes were reopened. Ted says Thursday morning, but it was Friday morning. Don't know how much read into that, but I doubt Pat would give him the wrong date.
>
> These people were on the original email from Pat on Friday morning: **To**: Fulton, Cedrick; Durando, Robert
> **Cc**: Baroni, Bill; Dunne, Joseph P.; Koumoutsos, Louis; Zipf, Peter; Samson, David; 'Rechler, Scott' ; Buchbinder, Darrell
>
> Sent from my iPad
>
> On Sep 18, 2013, at 5:35 AM, "Rechler, Scott' wrote:
>
>> I tend to agree. Seems like it is a by-product of the e-mail. If Pat leaked it he would have said that no one from the NY side new about it. Let's see what we hear from Samson et al this morning. In the meantime, let's continue to monitor the situation carefully and see if we can get more insight as to who spoke to the reporter.
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>>> The reference to Pat in the story could have come from anyone that received his email. I don't buy that he's behind I at all. They are trying to distract and now make it about us.
>>>
>>> Sent from my iPad

On Sep 17, 2013, at 10:50 PM, lisamacd wrote:

Story is up. I will also send to others on our team momentarily. I do not get sense after reading it that it came from Pat. There is one reference to him, but it doesn't sound like it came from him. Let me know what you think. Here is link:

http://online.wsj.com/article/SB10001424127887324665604579081630876156774.html?KEYWORDS=ted+mann

Bridge Jam's Cause a Mystery

New Jersey Officials Say They Weren't Warned That Local Lanes Would Be Closed

By

- TED MANN and
- HEATHER HADDON
- CONNECT

No one denies that the Port Authority of New York and New Jersey triggered massive traffic jams when it shifted local toll lanes onto the George Washington Bridge from New Jersey last week. But local officials, and some within the Port Authority itself, are scratching their heads over a larger question: Why?

The number of toll lanes to the George Washington Bridge from Fort Lee was reduced to one from three. Police and elected officials in Fort Lee, N.J., say they weren't given warning that the Port Authority planned to reduce the number of local access lanes directly from Fort Lee to the bridge from three to one—causing traffic to back up in the borough—and are still puzzled by the official explanation that the agency was conducting a study of traffic patterns.
After the two local lanes handling Fort Lee traffic were closed, cars and trucks quickly clogged streets used by local travelers to reach the bridge and New York City. Local officials said the backup led to long delays for Fort Lee buses traveling for the first day of school Monday. Within the Port Authority, meanwhile, the decision to close the traffic lanes caused tension, people with knowledge of the matter said. Those people said the lane closures came as a surprise to some high-ranking

officials at the bistate agency, which operates area bridges, tunnels and airports.
The local lanes were reopened Thursday morning, one of the people said, after an order from Executive Director Patrick Foye, who argued that the abrupt shift in traffic patterns caused a threat to public safety and should have been advertised to the public ahead of time.
For its part, the agency was sticking with a written statement. "The Port Authority has conducted a week of study at the George Washington Bridge of traffic safety patterns," it said. "We will now review those results and determine the best traffic patterns at the GWB. We will continue to work with our local law enforcement partners."
A Port Authority spokesman declined to elaborate or provide a further explanation of the origin, purpose or conclusions of the study.
Fort Lee Mayor Mark Sokolich, a Democrat who was first elected in 2007, said he found out about the lane closures Monday morning when the borough was turned into what he called "total gridlock."
The borough hall was flooded with hundreds of calls from angry motorists, Mr. Sokolich said.
"I get that the Port Authority tries different things. I'm very, very grateful that once they realized that this change was causing traffic gridlock, they ended it," said Mr. Sokolich, a local attorney. Mr. Sokolich said it still wasn't clear to him who ordered the closures or why.
Fort Lee police said they learned of the lane closures when traffic began backing up, down the north-south artery of Palisade Avenue, Deputy Chief Timothy Ford said.
"We called their police and they were like, 'We can't help you, it's coming from [our] higher-ups,'" he said. When the local police tried to ask the Port Authority leadership what was going on, he said, "They weren't returning our calls."
Mr. Ford said the police were eventually told the Port Authority was "trying something new" in the layout of the travel lanes leading to the toll plaza.
"I've been here 33 years, and in all that time we've always had three lanes dedicated to the Fort Lee traffic," he said. "And then on this Monday morning, with no prior warning, they decided to try something new."
A spokesman for the Christie administration referred questions to the Port Authority. A spokesman for the state Department of Transportation said the agency has no jurisdiction over the toll lanes and wasn't involved with any traffic study.
Amid the controversy, there was even speculation that the closures could be retribution for Mr. Sokolich's decision not to endorse Mr. Christie in his re-election bid in November. The Christie campaign has received endorsements from at least 48 elected Democrats across the state, including 17 mayors.
Mr. Sokolich said he had a good relationship with the Christie administration and couldn't imagine he would be important enough for the campaign to punish him for not publicly endorsing Mr. Christie. The mayor said he was supporting Democratic Sen. Barbara Buono, Mr. Christie's challenger.

"I've always been incredibly supportive of Gov. Christie even in the face of people criticizing me for it. I find it incomprehensible that there's any truth whatsoever to these rumors," he said.

Kevin Roberts, a spokesman for the Christie campaign, said that any notion that Mr. Sokolich faced retribution for not endorsing the governor was "crazy."

"We don't approach these folks and say, 'You will endorse us.' These are folks who have supported us" on their own, Mr. Roberts said.

Still, Mr. Sokolich said the incident made him wonder if he had run afoul of someone, somehow, though he didn't name anyone or any organization. "Maybe I'm getting too popular. Maybe I'm doing too many things, been too progressive," said the mayor, noting a spate of development in the borough. "We are proud of it. I've got to believe they are happy with the results."

Write to Ted Mann at ted.mann@wsj.com and Heather Haddon at heather.haddon@wsj.com

A version of this article appeared September 17, 2013, on page A19 in the U.S. edition of The Wall Street Journal, with the headline: Bridge Jam Is Still a Mystery.

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Sent: Wednesday, September 18, 2013 5:35 AM
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Cc: lisamacdc(
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Rechler, Scott

From: Rechler, Scott
Sent: Wednesday, October 02, 2013 12:26 PM
To: 'David Garten'
Subject: RE: FW:

That's what I figured. Agree about how they characterize the story.

From: David Garten
Sent: Wednesday, October 02, 2013 12:25 PM
To: Rechler, Scott
Subject: Re: FW:

This is the NJ political blog that was founded by Wildstein where he was "Wally Edge". How they characterize or cover the story is completely out of our hands.

On Wed, Oct 2, 2013 at 12:20 PM, Rechler, Scott < wrote:
FYI ... see note from Samson. Note the attachment ... I wonder who he forwarded this from?

-----Original Message-----
From: Samson, David
Sent: Wednesday, October 02, 2013 12:18 PM
To: Rechler, Scott
Subject: Fwd:

This is now extremely troubling.

Sent from my iPhone

Begin forwarded message:

WSJ sources: GBW lanes closed for political retaliation By PolitickerNJ Staff<http://www.politickernj.com/author/Politicker%20Staff> | October 2nd, 2013 - 10:27am Share on facebook<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on twitter<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on favorites<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on print<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> | More Sharing ServicesMore<http://addthis.com/bookmark.php?v=250&username=xa-4b397e5b5422fea1>

The Wall Street Journal is reporting<http://online.wsj.com/article/SB10001424052702304373104579109860563887326?mg=reno64-wsj.html?dsk=y> last month's closure of lanes on the George Washington Bridge is being seen by some in Bergen County as political retribution by New Jersey's Republican governor.

The report suggests Fort Lee's Democratic mayor was retaliated against for not having endorsed Gov. Chris Christie's re-election bid.

Local access lanes to the GWB were closed last month for multiple days for the Port Authority - which is jointly controlled by Christie and New York Gov. Andrew Cuomo - to perform a traffic study. However, people familiar with the dispute told the Wall Street Journal no study was conducted.

The lane closures triggered "massive congestion in Fort Lee for four straight weekdays" and ended abruptly after the authority's executive director fumed about the closure in an email and said the move likely broke state and federal laws, according to the report.

Christie's campaign labeled the suggestion the closure was retaliation as "crazy."

Rechler, Scott

From: Rechler, Scott
Sent: Wednesday, October 02, 2013 1:25 PM
To: David Garten
Subject: Re:

Gotcha.

Scott Rechler
CEO and Chairman
RXR Realty

On Oct 2, 2013, at 1:24 PM, "David Garten" < wrote:

> Also, I'm on a train headed to DC as we speak. I'll be in DC until Friday, but of course reachable by cell and email.
>
> On Oct 2, 2013, at 1:19 PM, David Garten wrote:
>
> Not sure why he's doing all the saber rattling. Not sure why he's blaming us for a political problem that was their own creation - closing the tolls lanes without telling us (deliberately), failing to disclose when it was included in the overnight clips, and then coming up with a false statement that said we were conducting a "study". An issue like this and the way they handled it - it's amazing that it's not an even bigger story.
>
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>
> That's what I figured. Agree about how they characterize the story.
>
> **From:** David Garten
> **Sent:** Wednesday, October 02, 2013 12:25 PM
> **To:** Rechler, Scott
> **Subject:** Re: FW:
>
> This is the NJ political blog that was founded by Wildstein where he was "Wally Edge". How they characterize or cover the story is completely out of our hands.
>
> On Wed, Oct 2, 2013 at 12:20 PM, Rechler, Scott wrote:
> FYI ... see note from Samson. Note the attachment ... I wonder who he forwarded this from?
>
> -----Original Message-----
> From: Samson, David
> Sent: Wednesday, October 02, 2013 12:18 PM

To: Rechler, Scott
Subject: Fwd:

This is now extremely troubling.

Sent from my iPhone

Begin forwarded message:

WSJ sources: GBW lanes closed for political retaliation By PolitickerNJ Staff<http://www.politickernj.com/author/Politicker%20Staff> | October 2nd, 2013 - 10:27am Share on facebook<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on twitter<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on favorites<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on print<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> | More Sharing ServicesMore<http://addthis.com/bookmark.php?v=250&username=xa-4b397e5b5422fea1>

The Wall Street Journal is reporting<http://online.wsj.com/article/SB10001424052702304373104579109860563887326?mg=reno64-wsj.html?dsk=y> last month's closure of lanes on the George Washington Bridge is being seen by some in Bergen County as political retribution by New Jersey's Republican governor.

The report suggests Fort Lee's Democratic mayor was retaliated against for not having endorsed Gov. Chris Christie's re-election bid.

Local access lanes to the GWB were closed last month for multiple days for the Port Authority - which is jointly controlled by Christie and New York Gov. Andrew Cuomo - to perform a traffic study. However, people familiar with the dispute told the Wall Street Journal no study was conducted.

The lane closures triggered "massive congestion in Fort Lee for four straight weekdays" and ended abruptly after the authority's executive director fumed about the closure in an email and said the move likely broke state and federal laws, according to the report.

Christie's campaign labeled the suggestion the closure was retaliation as "crazy."

Thank you.
****
IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
****

Rechler, Scott

From: Rechler, Scott
Sent: Tuesday, October 22, 2013 10:16 PM
To: David Garten
Subject: Re: FL update

I spoke to Pat this evening and gave him my thoughts on the memo as we discussed earlier. He seemed to agree with same. I am going to call HG tomorrow to make sure he is on the same page (Pat said he didn't speak to HG about the memo yet).

Speak to you tomorrow.

Scott

Scott Rechler
CEO and Chairman
RXR Realty

On Oct 22, 2013, at 8:35 PM, "David Garten" > wrote:

> Just following up on this. I spoke with John. He said they had their last interview yesterday and that was with Peter Zipf. John said that the plan was to write a memo to file. John gets very quiet when I talk to him about it like he's withholding something.
>
> I also spoke to Pat. My goal with Pat on this has been that we don't have to do anything to fan the flames and tease him with the idea that other people may pick up on it in an effort to keep him from taking any initiative on his own. For example, I mentioned to Pat that the Senate Commerce Committee is aware of FL and they may write a letter or something (they won't). Or that Ted Mann may write another story given that he hasn't written on DW being in Fort Lee yet. But the point is that we need to continue to be smart and let it play it out without fanning the flames.
>
> I don't know if you've had a chance to talk to Pat yet, but if he's so focused on documenting everything then how about the following - he types a detailed memo that he produces on his home computer, gives a hard copy to the 2nd floor to keep and use, and then type up a general memo for his files at the PA. That way we have a thorough documented account, it's in the 2nd floor's hands, which could build good will between Pat and the Governor, and then a general memo at the PA in case we get subpoenaed.
>
> On a side note, Pat said he would look at the 21st Century Airports piece tonight and get me comments.
>
> On Tue, Oct 22, 2013 at 10:44 AM, David Garten > wrote:
> Pat said he spoke to HG. The 2nd floor will not be calling Loretta Weinberg back. Pat said the 2nd floor wants sit back, continue to have no rule, and let it play out however it plays out. Pat also said that his review is pretty much done and he isn't conducting anymore staff interviews.

Rechler, Scott

From: Rechler, Scott
Sent: Thursday, December 05, 2013 9:56 AM
To: 'David Garten'
Subject: RE: just in case you didn't see this in the clips

Nervous.

From: David Garten
Sent: Thursday, December 05, 2013 9:55 AM
To: Rechler, Scott
Subject: Re: just in case you didn't see this in the clips

Samson mad?

I spoke with Pat and Lisa. We're all on the same page for Monday. Lisa said that Howard and Larry told Pat the same thing the governor told you.

Sent from my iPhone

On Dec 5, 2013, at 9:26 AM, "Rechler, Scott" wrote:

> Saw it and already heard from Samson about it.
>
> Scott Rechler
> CEO and Chairman
> RXR Realty
>
> On Dec 5, 2013, at 8:37 AM, "David Garten" wrote:
>
> # Port Authority official from N.Y. to testify in controversy over lane closures at George Washington Bridge
>
> **WEDNESDAY, DECEMBER 4, 2013 LAST UPDATED: WEDNESDAY DECEMBER 4, 2013, 11:26 PM**
> BY SHAWN BOBURG
> STAFF WRITER
> THE RECORD
> PRINT | E-MAIL
>
> A top Port Authority executive from New York who privately described mysterious lane closures on the George Washington Bridge as "abusive" —

and maybe even illegal — said Wednesday he plans to testify next week before New Jersey lawmakers looking into whether the world's busiest bridge was turned into a political weapon.

Monday's planned testimony by Pat Foye, New York Gov. Andrew Cuomo's top appointee at the bi-state agency, threatens to open the first public rift between Governor Christie and Cuomo, rising stars in their respective parties who have made efforts to appear friendly. But the growing controversy — and the conflicting stories by each governor's representative at the agency — seem to have put them on a collision course.

Christie's appointees have described the surprise lane closures, which caused three-hour traffic jams in September in Fort Lee, as a simple traffic study. But an internal email written by Foye has fueled speculation by Democrats that the study, quietly ordered by a top Christie appointee without any notice to the public or agency traffic experts, was payback against Fort Lee's mayor — a Democrat who did not endorse the governor in his campaign for reelection.

Related: Port Authority exec subpoenaed over GWB gridlock

On Wednesday, at the agency's monthly meeting in Manhattan, Foye said for the first time that he stood by the leaked email, in which he alleged that agency protocol was "wrongfully subverted" and that state and federal laws may have been broken. His comments Wednesday were brief, only serving to confirm his plans to testify and making reference to the Sept. 13 email. But they indicated a deep dispute that extends to Trenton and Albany.

Top executives at the agency rarely make significant announcements or comment on sensitive matters without getting approval from advisers close to each governor. A spokesman for Christie did not respond to a request for comment on Wednesday.

Standing next to Foye at the lectern was Christie's top executive, Bill Baroni, who declined to respond to his counterpart's comments during the press conference that typically follows the agency's monthly meetings. Baroni repeatedly said he had already given extensive testimony last week in a combative hearing before the state Assembly Transportation Committee in Trenton.

Foye declined an invitation to appear that day. However, the Transportation Committee issued a subpoena last week compelling him to appear on Monday. It's unclear if the subpoena power claimed by the New Jersey lawmakers applies to New York public officials. Foye did not say whether he believed he was legally compelled to go to Trenton.

A central figure in the controversy was not at the press conference: David Wildstein, a former political consultant who went to high school with Christie and wields enormous power as the agency's director of interstate capital projects. It was Wildstein who ordered the lane closures after the president of the Port Authority police union raised concerns about traffic, Baroni told the Assembly panel last week. The 1,300-member union endorsed Christie, and its president, Paul Nunziato, works closely with Wildstein.

Nunziato, who attended Wednesday's meeting, said he mentioned his concern to Wildstein "over breakfast," during one of the "hundreds" of conversations they have had about everything from public safety to traffic to police staffing levels. He was asked why the agency's traffic engineers were evidently not involved in, or informed about, the study.

"They [expletive] up everything," he said. "Do I know more than a traffic engineer? Do my guys know more? Yeah, probably, because we stand out there all day."

Nunziato called Foye's email "a load of garbage," suggesting it was an effort to undermine New Jersey's influence within the agency, which doles out cash for major public works projects on both sides of the Hudson River. The agency is currently deciding what projects it will undertake over the next 10 years, a process that often heightens interstate tensions.

"It's like the Sharks and the Jets here," Nunziato said about New York and New Jersey, a reference to rival street gangs in the musical "West Side Story."

Nunziato's union gave Christie an early endorsement last year — in January, when he stood next to the governor and said: "I know that I don't have to worry when Chris Christie says he has our back; he has been there every time."

Christie's decision to support keeping Port Authority police at the World Trade Center instead of ceding those jobs to New York City police was popular with the powerful union.

In his testimony last week, after months of silence, Baroni said the traffic study was meant to determine whether Fort Lee deserved three access lanes to tollbooths from local roads. He suggested it was an unfair allocation that slowed down traffic for the rest of New Jersey's drivers heading east across the bridge. The proportion of lanes dedicated to the Fort Lee traffic, he said, was much higher than the percentage of bridge traffic that originates in the borough.

Senate Majority Leader Loretta Weinberg, a Democrat from Teaneck, said Wednesday that analysis was flawed because drivers from throughout Bergen County and Hudson County use those access lanes.

"These lanes are not limited to the exclusive use of Fort Lee residents," she said, during her fourth appearance at a commissioners meeting since September to ask for answers to unresolved questions. "Leaving that impression was completely inappropriate."

Baroni's testimony about the traffic study also failed to satisfy Assemblyman Gordon M. Johnson, D-Englewood, who spoke at the meeting, too.

"He talked about a traffic study and fairness," he said of Baroni. "He should have began his testimony with 'Once upon a time' because it was a fairy tale."

Email: boburg@northjersey.com

- See more at:
http://www.northjersey.com/news/Port_Authority_police_union_wades_into_GWB_lane_closure_tiff.html?page=all#sthash.vMxI5oyA.dpuf

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- See more at:
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Rechler, Scott

From: Rechler, Scott
Sent: Thursday, December 12, 2013 12:49 PM
To: David Garten
Subject: FW: Afternoon Clips: 12.12.13

Interesting that there are other reporters contributed to the story. Do we know who they are?

From: Schwarz, Arielle [mailto:aschwarz@panynj.gov]
Sent: Thursday, December 12, 2013 12:31 PM
To: Schwarz, Arielle
Subject: Afternoon Clips: 12.12.13

PANYNJ

Governors Spoke Privately About Bridge Controversy
Chris Christie Complained to Andrew Cuomo That His Appointee Was Pressing too Hard for Answers
By Ted Mann, Erica Orden, and Heather Haddon
The Wall Street Journal

New Jersey Gov. Chris Christie called New York Gov. Andrew Cuomo this week to complain about a Cuomo appointee's handling of a growing controversy over traffic pattern changes on the George Washington Bridge, a person familiar with the matter said. Mr. Christie, a Republican, complained in a private phone call to Mr. Cuomo, a Democrat, that Patrick Foye, the executive director of the Port Authority of New York and New Jersey, was pressing too hard to get to the bottom of why the number of toll lanes onto the bridge from Fort Lee, N.J. was cut from three to one in early September, according to this person. The lane closures occurred without notice to local authorities, officials have said, and snarled traffic for a week in the small borough on the Hudson River bluffs. Messrs. Cuomo and Christie share control of the sprawling Port Authority, which oversees Hudson River bridges and tunnels and the region's airports and is rebuilding the World Trade Center complex in Manhattan.

Gov. Cuomo Calls Port Authority Controversy Over GWB Lane Closures a 'New Jersey Issue'
By Ken Lovett
New York Daily News – Full Text

Blame New Jersey. That was basically Gov. Cuomo's response when asked about the ongoing controversy regarding the September lane closures on the George Washington Bridge. "This is more of a New Jersey issue," Cuomo said to host Susan Arbetter on public radio's "The Capitol Pressroom" this morning. He noted the New Jersey state Legislature is holding hearings on the issue. "I don't know anything more than basically what's been in the newspapers, but this is basically a New Jersey issue," Cuomo said. For four days in September, two of the lanes on the George Washington Bridge were ordered closed, leading to delays of up to four hours that backed up into Fort Lee, NJ. Port Authority Deputy Executive Director Bill Baroni, an appointee of New Jersey Gov. Chris Christie, has since said the lane closures were done for a traffic study. But Cuomo-appointed Port Authority Executive Director Pat Foye, who ordered the bridge fully reopened after four days, said he wasn't aware of such a study. A host of lawmakers have called for Baroni to be fired by Christie. Some have said the lane closures that impacted Fort Lee were ordered by a close associate of Christie in retaliation for the Democratic mayor not endorsing the Republican governor's re-election bid--a notion Christie has dismissed.

A bridge too far
By Carl Golden
NJ Voices

By any measure, the last four years of Democratic control of the Legislature yielded the party little political benefit. In his first term, Gov. Christie dominated the public debate so completely that legislative majorities teetered on the edge of irrelevancy. For four years, the budgets Christie wanted were the ones he got. The current budget, in fact, was approved by the Legislature nearly three weeks before the fiscal year deadline and with nary a substantive change from the governor's original recommendation. His flurry of vetoes were all sustained, even on issues which enjoyed broad public support — gun control, reinstatement of a surtax on millionaires and same sex marriage, for example. The Democratic leadership huffed and puffed and vented their collective outrage, only to be casually dismissed with a tart made-for-Youtube retort from a governor who enjoyed seventy per cent plus approval ratings.

Respite room comforts family of sick kids
By Debra Rubin
New Jersey Jewish News

Rabbi Yosef Carlebach's grandson was born last year with a heart condition so serious doctors gave him little chance of surviving. However, after "many surgeries" that took him around the country and finally to the Children's Specialized Hospital in New Brunswick, the boy, Mendel Avtzon, is expected to fully recover. Along the way to that recovery, Carlebach said, he was given the unexpected opportunity to perform mitzvot for others. The infant's condition also gave the executive director of Rutgers Chabad the chance to meet and ultimately partner with the hospital's president and CEO, Amy B. Mansue, to help others facing the serious illness of a child. ... Also honored at the dinner was former State Sen. Bill Baroni, deputy executive director of the Port Authority of New York and New Jersey. He was given the Ner Tamid Award on the seventh night of Hanukka for his role in ensuring the lighting of hanukkiot at Port Authority sites, including at its bridges and tunnels. Rabbi Mendy Carlebach of Chabad of North and South Brunswick said he and Baroni had lit a menora the previous night at 7 World Trade Center in lower Manhattan.

Audit finds Becton in 'good' financial shape, but must monitor projects purchase and change orders
By Kelly Nicholaides
South Bergenite

Despite paying over $1 million for extras over budget from capital reserves, and having $1,669,000 left over for extras not covered by the Port Authority of NY/NJ and Federal Aviation Administration soundproofing and HVAC grants, the Becton Board of Education needs to pay closer attention to purchase orders and change orders, an audit reveals. However, the board is financially sound, particularly taking into consideration a massive $19,165,000 soundproofing and HVAC project, auditor Jeff Bliss told the board at the Dec. 11 meeting. "Financially, you're in good shape. There's a couple of things you need to tweak," Bliss said. "You're in a very good position. There's no structural deficit to make up for."

East Harlem Group Using Homeless to Tackle Trash Problem Wins $100K Grant
By Jeff Mays
DNAinfo

The merchant association that is using homeless people to help clean the streets of El Barrio won a $100,000 grant from the city Department of Small Business Services Wednesday to help turn the area near the Metro-North station into an "Uptown Grand Central." Kwanza Smith, executive director of the New East Harlem Merchants Association, said the money will be used to fund the group's collaboration with the Association of Community Employment Programs for the Homeless. A group of 6 to 8 men will clean between Fifth and Second avenues, between 124th and 126th streets Monday through Friday. ... Now NEHMA is working with the Grand Central Partnership to get planters and other artifacts from Grand Central Terminal to beautify the area which is one of only three three tri-modal transportation hubs, with buses, subways and commuter rail, in the city along with Penn Station and Port Authority.

PORTS

Dozens of developers show interest in Bayonne Harbor land
By Felix Alarcon
The Jersey Journal

More than two dozen development firms have already responded to Bayonne's official "request for an expression of interest" in 55 acres of undeveloped land at the Peninsula at Bayonne Harbor as the city is seeking high-end commercial interests. "Many exciting redevelopment projects are already bringing jobs and tax ratables to Bayonne," Mayor Mark Smith said. "The 55 acres that are now available for redevelopment at the Peninsula at Bayonne Harbor will offer the biggest opportunity in several years to make a major impact on the future of Bayonne." City officials said: "While some of the Peninsula property has been sold to the Port Authority, there are still dozens of city-owned acres scheduled for private redevelopment projects. This 55-acre tract known as the Harbor Station South is one of them." Smith said the submissions are intended to be "high-level concept plans."

AVIATION

During Super Bowl week, Teterboro Airport will require reservations for arrivals, departures

By Richard Newman
The Record

Private jet travel during Super Bowl week will not be the hassle-free, come-and-go-as-you-please experience travelers normally expect at local airports. Teterboro Airport, one of the busiest in the country for private jets, and at six miles away the closest one to MetLife Stadium, will not be able to handle all of the Gulfstreams, Falcons and Bombardiers expected to fly into the area for Super Sunday. That's why federal authorities have declared that for a six-day period, from 6 a.m. on the Wednesday before the game until 6 a.m. on the Tuesday after, the only aircraft that will be cleared for landings and takeoffs will be those that made reservations well in advance. Normally, reservations are not required at Teterboro. Pilots who fail to comply with the temporary Previous Permission Required rule will be diverted to other airports, said Kirk Stephan, marketing manager at Meridian, one of several aircraft service station operators at Teterboro that are taking Super Bowl week reservations. "If you don't have a PPR, you won't be able to fly in or out of Teterboro," Stephan said.

WTC

Years late and over budget, Fulton Transit Hub nearly complete
But displaced businesses decry a lack of relocation services
By Julie Strickland
The Real Deal

Ten years and millions over budget, Fulton Street Transit Center is near completion. The City Council' s Transportation Committee got an update on the Metropolitan Transportation Authority's $1.4 billion Lower Manhattan megaproject Wednesday. The massive undertaking will ultimately link 11 different subway lines at 6 stations. By 2016, the center will also connect with the Port Authority's World Trade Center Transportation Hub. However, costly delays have been a source of ongoing frustration, city officials told the committee. "It's disappointing that the Fulton Center's project costs have increased by millions of dollars and that the construction itself has encountered so many unforeseen holdups," James Vacca, a Bronx Councilman, told NY1. Another bone the community had to pick with the MTA is the displacement of 150 area businesses, which an MTA official said Wednesday will not have first dibs on the hub's retail space when it opens next year. The authority said it will announce Fulton Center's master lease holder for the site's 65,000 square feet of retail space within the next month, and that the winner will offer market-rate rentals to retailers.

PATH

Booze Will Be Banned on LIRR During SantaCon
By Alan Neuhauser
DNAinfo

Leave the eggnog at home. The Long Island Rail Road is closing the doors on soused Santas this weekend — instituting a 24-hour booze ban from noon Saturday through noon Sunday that overlaps with the SantaCon bar crawl. "We do it based on experience, based on when we've had difficulties....when we're going to be inundated with a lot of people under 21, or maybe just over 21, where they've created problems in the past," LIRR spokesman Salvatore Arena said. The LIRR typically allows passengers to drink alcohol aboard the train, but it does "occasionally institute a ban for short periods of time," Arena said, such as on St. Patrick's Day and the night before Thanksgiving. It also prohibits alcohol consumption between midnight and 5 a.m. on Friday and Saturday nights. ... "As of now, a final determination has not yet been made regarding our policy for Saturday/Sunday," spokesman Will Smith said in a statement Wednesday, adding that alcohol consumption is prohibited aboard its buses at all times. The Port Authority, meanwhile, prohibits drinking on PATH trains. Representatives for Metro-North did not return a request for comment.

Rechler, Scott

From: David Garten
Sent: Wednesday, December 18, 2013 4:58 PM
To: Rechler, Scott
Subject: Re: Was there a study?

In a series of emails between the Engineering Department, TBT and David Wildstein, there is a paper trail where that was some effort to give the impression that a traffic study was being conducted. Again, this would be from the understanding that this was a traffic study only in the way that Wildstein would define a traffic study.

One other take way, Baroni testified that there was a "failure to communicate". As you know, it's more than a failure to communicate, they specifically told career staff not to tell anyone and they purposely did not respond to any inquiries during the "test" (Wildstein's instructions to Baroni to be "radio silent" on the Mayor's call).

I only have hard copies of these emails, but I scan some of these items and email them to you if you'd like.

Timeline

August 28th - there is a series of emails within the Engineering Department on the placement of cones in an effort to decrease the number of lanes from Fort Lee to the GWB.

August 29th - staff from the Engineering Department emailed Peter Zipf and David Wildstein four scenarios for the Fort Lee toll lanes:

- Traffic moving freely with no cones diverting traffic
- Cones in use to segregate Fort Lee traffic from the mainline traffic (how it's currently used)
- Decreasing the 3 lanes to 2 lanes
- Decreasing the 3 lanes to 1 lane

September 6th - Peter Zipf emails his department to say that he was advised that Wildstein wanted to go with Scenario 4, which is to decrease the 3 lanes to 1 lane.

September 6th - there is a series of emails between the Engineering Department and TBT about measuring the traffic impacts and instructing to take "daily summaries". There is a series of emails within the Engineering Department about measuring the traffic impact, noting that they can measure the traffic in a similar manner to what they did on the "orthotropic deck replacement, and one email noting that the difficulties of measuring traffic in Fort Lee due to a lack of travel time readers on local streets. They develop contingencies to measure the traffic in Fort Lee.

September 8 - Wildstein emailed Durando to say that he will be at the bridge early Monday to view the lane test. Durando tells Wildstein that the signs are being covered and that the PAPD are aware and will control traffic. He also brought on an extra toll collector for the first day of the lane closures.

September 9th - (the first day of the closures), Durando provides summaries of the traffic and the complaints received. Durando sends summaries every day throughout the "test". Engineering also conduct daily assessments of traffic patterns and travel times each day, but makes note that due to an incident on the Cross Bronx Expressway on Monday, they can't take an accurate measure of the traffic patterns.

Both TBT and Engineering conduct daily analysis of traffic numbers and patterns throughout the week. This analysis is emailed to the different parties involved.

September 11th - engineering sends around an analysis that demonstrates reduced travel times on the main line. However, they note that congestion has severely increased in Fort Lee. Engineering also provides analysis in a series of line graphs comparing travel times for that week and a typical day.

September 12 - TBT develops a powerpoint presentation entitled, "Reallocation of Toll Lanes at the GWB - An EARLY assessment of the benefits of the trial." The conclusion page of the presentation is left blank.

September 24 - Wildstein received a break down of EZ-Pass holders crossing the GWB.

On Wed, Dec 18, 2013 at 10:19 AM, David Garten wrote:
Hey Scott -

I did some digging on what sort of prep work occurred before they shut down the toll lanes and it really comes down to whose definitely of a "traffic study". In the twisted mind of David Wildstein, he did in fact conduct a traffic study. He spoke with engineering and TBT. They conducted analysis on where the cones should be places and how to manage traffic on the bridge. David Wildstein's actions broke every agency protocol, but in his mind he was conducting a traffic study. He bullied, intimidated and lied to all the people involved in the study, perhaps even Baroni. But he did in fact conduct his own study.

So Baroni was somewhat correct in his testimony - they failed to communicate, but they did in fact conduct their own twisted version of a "traffic study". They actually purposefully refused to communicate and Wildstein instructed Baroni to be radio silent when the mayor of fort lee called about an urgent matter of public safety.

One problem is that Christie keeps saying that Fort Lee shouldn't have their own toll lanes. He could have ended this by saying, "These are the actions of two rogue employees who are no longer at the PA and it will never happen again."

Assuming none of the emails show any linkage to Christie, they could very well tell this story - this was the action of a rogue employee.

Rechler, Scott

From: David Garten
Sent: Wednesday, December 18, 2013 9:28 PM
To: Rechler, Scott
Subject: Document review

I went through another round of documents that will be handed over to the committee. The documents consisted of emails from Pat, Wildstein, Cedric, Durando, and Licorish (the PAPD officer at the GWB). No major departure from what we already know in regards as to whether this was a study. Those involved referred to the study as the "Toll Lane 24 Test". But there are problematic emails from PAPD officers, Commissioner Schuber, and a curious exchange between Philippe and Wildstein.

I wanted to let you know that I have not shared any of this info with Pat.

Pat's emails to the 2nd floor - not particularly problematic, mainly informing

Pat forwards the email you sent on September 13th that includes your statement about this being "terribly disturbing" with Pat's original 7:44am email included to HG.

Pat forwarded a letter from NJ Senator Codey calling for an IG investigation to HG, Vlasto, Melissa DeRosa.

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Exchange between Wildstein and Durando - September 13

Durando forwarded to Wildstein an email from Pat requesting that Durando call him. Durando tells him that Pat wants to know why he wasn't told of the toll lane closure. Wildstein responds and says, *"His staff knows, but bb will to him."*

Durando email to Cedric on September 9th

Durando tells Cedric that he's supposed to talk to Wildstein later that day. He notes that TBT is working on "comparative look at traffic numbers" (another indication of a "study"). Durando says that he was advised by the Fort Lee Police Chief that he would be calling Baroni about the lane closures and that specifically traffic conditions requiring FL officers to remain out on corners managing traffic instead of attending to public safety issues. The Chief apparently expressed concern about emergency response vehicles being able to respond.

Durando email from his staff on September 9th

This email will be explosive in a hearing: *I just got another call from a patron ... she says that the Port Authority "doesn't care about their customers and they are playing God with people's jobs". Her husband was 40 minutes late to a job that he just got after being out of work for over a year. She said a lot of other things, but I will spare you her rant!*

Durando email to Cedric Fulton on September 8th, the day before the study began

Durando appears to have made an attempt to walk Wildstein back, but fails. Durando says, *"Took a shot. He didn't bite."*

PAPD Emails - incredibly disturbing for a number of reasons - they appear to know that this will be a public safety issue, but chose to ignore it; they appear to keep the company line of not communicating; senior PAPD officers (Koumoutsos) are aware of the toll lane closures and they did not inform the CSO or his Deputy.

September 6 - Licorish informs his higher ups that Durando was instructed by Wildstein to change traffic patters. His email notes that the new traffic pattern "could impact the volume of traffic from the local streets." His email notes that Wildstein is scheduled to visit the GWB on September 9.

Emails stating that the traffic pattern will continue during the week. Gloria Frank who is senior to Licorish tells Licorish to inform the Ft. Lee Inspector that the traffic pattern will remain in place per her.

Emails stating that the new traffic pattern will affect normal rush hour operation and that concerns were made to "no aval locally".

Multiple Emails from Durando and Tina Lado (NJ Director of Government Affairs) Highlighting Concerns

One potentially explosive email came from Tina Lado to Baroni, Wildstein and Cedric on September 9, 2013 at 11:24am:

Wanted you both have a heads up--Peggy Thomas, Borough Administrator, called me regarding the increased volume and congestion of AM rush traffic throughout the Borough as a result of the GWB toll lanes adjustment that occurred.

She mentioned that there were 2 incidents that Ft Lee PD and EMS had difficulty responding to; a missing child (later found) and a cardiac arrest.

She stated additionally that the Borough and PD had no advance notice of the planned change. Also, Bill the Mayor had placed calls to your office.

Schuber Emails

Wildstein sent Schuber a draft letter for Schuber to send to Loretta Weinberg. The draft stated: *Thank you for your letter regarding the recent traffic study performed at the George Washington Bridge. Generally, a modification of operations at one of the Port Authority's Tunnels Bridges and Terminals facilities, like the George Washington Bridge, is not something that would be presented before the Board of Commissioners. However, I will ask that our Port Authority Police Department in the future notify and work more closely with local law enforcement entities when there is a significant change in operations at our facilities. Thank you again for your concern.*

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Philippe emails to Wildstein

On October 9th, Philippe emailed Wildstein the following: *Has any thought been given to writing an op-ed or providing a statement about the GWB study? Or is the plan just to hunker down and grit our way through it?*

Wildstein replied with: *Yes and yes*

Rechler, Scott

From: Rechler, Scott
Sent: Wednesday, December 18, 2013 10:31 PM
To: David Garten
Subject: Re: Document review

Thanks ... this is helpful.

Scott Rechler
CEO and Chairman
RXR Realty

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Wildstein replied with: *Yes and yes*

Rechler, Scott

From:	Rechler, Scott
Sent:	Thursday, December 05, 2013 9:46 PM
To:	'David Garten'
Subject:	RE: Potential TPs - let me know what you think

It looks like the concept has traction.

From: David Garten [
Sent: Thursday, December 05, 2013 8:12 PM
To: Rechler, Scott
Subject: Re: Potential TPs - let me know what you think

Got it.

By the way, assuming Samson isn't BSing, if he can't deliver then we know who runs the show on the NJ side.

On Dec 5, 2013, at 4:05 PM, Rechler, Scott wrote:

By the way, I would try to soften this a bit if we end up having to go through with it.

From: David Garten
Sent: Thursday, December 05, 2013 11:06 AM
To: Rechler, Scott
Subject: Potential TPs - let me know what you think

These TPs need to be phrased a little better, but what do you think of Pat hitting the following in his testimony. I'm also working on potential TPs to questions:

I have a great working relationship with my colleague and friend, Bill Baroni.

Governor Cuomo and Governor Christie have a great working relationship and equally committed to the shared goal of a well-run, efficient Port Authority that both states deserve. [This will require approval from the 2nd floor, but I would love for Pat to say some version of this - it would put Christie in a very difficult spot with national GOP].

Tout the accomplishments of the PA since both Governors took over - reform, accomplishments, and what's on the horizon in the coming months - investing in the region with the capital plan and continued reform.

What occurred the week of September 9th at the GWB was appalling and is not the way that the PA conducts business. When I learned of the closures, I did X, Y, and Z.

For some inexplicable reason, Mr. Wildstein ordered a traffic study that included the closures of two of the three toll lanes that provide access to X yearly cars and trucks to the world's busiest crossing.

Every year the Port Authority conducts X number of traffic studies and we have never conducted any of these studies in the manner that occurred on September 9th.

When the PA conducts a traffic study, this is what we do...it does not and has never involved the actual closing of lanes. In the event that we do have to close lanes at any of our crossings, the PA's stated policy is to X, Y, and Z.

In my review of the incident, which is still ongoing, I have learned that Mr. Wildstein did more than just fail to communicate - in addition to making the decision to close the toll late without informing me, the PA Board, and the Fort Lee community, ignoring long standing PA Policy and Procedures, I have learned that Mr. Wildstein called Bob Durando, an X year career employee of the PA and general manager of the GWB, and Cedric Fulton, an X year career employee and the Director of the PA's Bridges and Tunnels Department, to not only close the two toll lanes, but to not tell anybody of the action. This was not a failure to communicate, but a direct action on the part of Mr. Wildstein to silence PA employees about doing something that they have never been asked to do.

The efficient flow of traffic at all of our crossings is very important. In light of the concern that the Fort Lee toll lanes play a role in disrupting the flow of traffic at the GWB, working with the Deputy Executive Director we will direct the X department to review not only the GWB, but all of our crossings to report to our Board how traffic flow can be improved. [Let me know what you think of this - it addresses Christie's statements that this needs to be looked at. So we throw them a bone, while still directing the fire at DW.]

Rechler, Scott

From: Rechler, Scott
Sent: Sunday, December 08, 2013 7:52 PM
To: David Garten
Subject: Re: Final Remarks

It worries me as Howard may not be in the loop from the source.

Sent from my iPhone

On Dec 8, 2013, at 7:22 PM, "David Garten" < ;> wrote:

> I think it's done. I think we were boxed out for a reason and going to the 2nd floor for sign off before we saw it was intentional as well.
>
> Sent from my iPhone
>
> On Dec 8, 2013, at 7:20 PM, "Rechler, Scott" wrote:
>
>> How do you think we best deliver this message back to Lisa or do you think it is done.
>>
>> Sent from my iPhone
>>
>> On Dec 8, 2013, at 7:18 PM, "David Garten" < wrote:
>>
>>> It refers to Bill as the ED. So that's a typo. I think it should say that DW unilaterally made the decision.
>>>
>>> And I think it's too open ended - it says that the review is still ongoing (is more to come?) and it says that procedures weren't followed but I think that instead Pat putting into place checks and balances, it should say that Pat worked with Bill to ensure that it will never happen again.
>>>
>>> And yes, I think it should say the governors work productively together. That being said, if tomorrow goes south then the testimony is framed so it's all on Pat. I would have framed this differently to make it more as DW as a rogue employee.
>>>
>>> Sent from my iPad
>>>
>>> On Dec 8, 2013, at 6:59 PM, "Rechler, Scott" wrote:
>>>
>>>> What do you think? Do you think we need to say something that NY and NJ have worked

productively together under the Cuomo and Christie administrations? Scott

Scott Rechler
CEO and Chairman
RXR Realty

On Dec 8, 2013, at 6:56 PM, "David Garten"
_> wrote:

FYI

Sent from my iPhone

Begin forwarded message:

From:
lisamacdc(
Date: December 8, 2013 at 6:51:16 PM EST
To:
davidgarten,

johnma93

cvalens(
Cc: pjpfoye
Subject: Final Remarks

Pat's final remarks for tomorrow are attached. This incorporates feedback from the second floor. I have also shared with Scott.

<PF_Remarks_to_the_NJ_State_Ass embly_Committee__12-9-13.doc>

Rechler, Scott

From: David Garten
Sent: Thursday, December 19, 2013 12:10 PM
To: Rechler, Scott
Subject: Re: Was there a study?
Attachments: Engineering Emails.pdf; Fort Lee Trial Review 2013-0912.ppt

Follow Up Flag: Follow up
Flag Status: Flagged

Scott -

I spoke to Peter Zipf today and received more clarity how this went down. Wildstein called Peter Zipf and said that he didn't think it was right for traffic to flow smoothly from Fort Lee while the mainline traffic is congested, that he wanted to move the cones to reduce the number of Fort Lee lanes, and see what effect it would have in terms of traffic flow. Peter explained the issue of having Fort Lee traffic flow into the mainline traffic freely so Peter and the engineering department came up with four scenarios. Attached is a series of emails within Engineering and with Wildstein.

While the engineering department prepared the analysis in terms of how traffic should flow with the reduced toll lanes for Fort Lee, TBT conducted the analysis throughout the test. Attached is a power point presentation that shows some of the preliminary results of the test.

Let me know if this works or if you want me to scan more items.

On Wed, Dec 18, 2013 at 4:58 PM, David Garten wrote:
In a series of emails between the Engineering Department, TBT and David Wildstein, there is a paper trail where that was some effort to give the impression that a traffic study was being conducted. Again, this would be from the understanding that this was a traffic study only in the way that Wildstein would define a traffic study.

One other take way, Baroni testified that there was a "failure to communicate". As you know, it's more than a failure to communicate, they specifically told career staff not to tell anyone and they purposely did not respond to any inquiries during the "test" (Wildstein's instructions to Baroni to be "radio silent" on the Mayor's call).

I only have hard copies of these emails, but I scan some of these items and email them to you if you'd like.

Timeline

August 28th - there is a series of emails within the Engineering Department on the placement of cones in an effort to decrease the number of lanes from Fort Lee to the GWB.

August 29th - staff from the Engineering Department emailed Peter Zipf and David Wildstein four scenarios for the Fort Lee toll lanes:

- Traffic moving freely with no cones diverting traffic
- Cones in use to segregate Fort Lee traffic from the mainline traffic (how it's currently used)
- Decreasing the 3 lanes to 2 lanes
- Decreasing the 3 lanes to 1 lane

September 6th - Peter Zipf emails his department to say that he was advised that Wildstein wanted to go with Scenario 4, which is to decrease the 3 lanes to 1 lane.

September 6th - there is a series of emails between the Engineering Department and TBT about measuring the traffic impacts and instructing to take "daily summaries". There is a series of emails within the Engineering Department about measuring the traffic impact, noting that they can measure the traffic in a similar manner to what they did on the "orthotropic deck replacement, and one email noting that the difficulties of measuring traffic in Fort Lee due to a lack of travel time readers on local streets. They develop contingencies to measure the traffic in Fort Lee.

September 8 - Wildstein emailed Durando to say that he will be at the bridge early Monday to view the lane test. Durando tells Wildstein that the signs are being covered and that the PAPD are aware and will control traffic. He also brought on an extra toll collector for the first day of the lane closures.

September 9th - (the first day of the closures), Durando provides summaries of the traffic and the complaints received. Durando sends summaries every day throughout the "test". Engineering also conduct daily assessments of traffic patterns and travel times each day, but makes note that due to an incident on the Cross Bronx Expressway on Monday, they can't take an accurate measure of the traffic patterns.

Both TBT and Engineering conduct daily analysis of traffic numbers and patterns throughout the week. This analysis is emailed to the different parties involved.

September 11th - engineering sends around an analysis that demonstrates reduced travel times on the main line. However, they note that congestion has severely increased in Fort Lee. Engineering also provides analysis in a series of line graphs comparing travel times for that week and a typical day.

September 12 - TBT develops a powerpoint presentation entitled, "Reallocation of Toll Lanes at the GWB - An EARLY assessment of the benefits of the trial." The conclusion page of the presentation is left blank.

September 24 - Wildstein received a break down of EZ-Pass holders crossing the GWB.

On Wed, Dec 18, 2013 at 10:19 AM, David Garten wrote:
Hey Scott -

I did some digging on what sort of prep work occurred before they shut down the toll lanes and it really comes down to whose definitely of a "traffic study". In the twisted mind of David Wildstein, he did in fact conduct a traffic study. He spoke with engineering and TBT. They conducted analysis on where the cones should be places and how to manage traffic on the bridge. David Wildstein's actions broke every agency protocol, but in his mind he was conducting a traffic study. He bullied, intimidated and lied to all the people involved in the study, perhaps even Baroni. But he did in fact conduct his own study.

So Baroni was somewhat correct in his testimony - they failed to communicate, but they did in fact conduct their own twisted version of a "traffic study". They actually purposefully refused to communicate and Wildstein instructed Baroni to be radio silent when the mayor of fort lee called about an urgent matter of public safety.

One problem is that Christie keeps saying that Fort Lee shouldn't have their own toll lanes. He could have ended this by saying, "These are the actions of two rogue employees who are no longer at the PA and it will never happen again."

Assuming none of the emails show any linkage to Christie, they could very well tell this story - this was the action of a rogue employee.

Rechler, Scott

From: Rechler, Scott
Sent: Wednesday, October 02, 2013 12:20 PM
To: David Garten
Subject: FW:
Attachments: image001.jpg

FYI ... see note from Samson. Note the attachment ... I wonder who he forwarded this from?

-----Original Message-----
From: Samson, David
Sent: Wednesday, October 02, 2013 12:18 PM
To: Rechler, Scott
Subject: Fwd:

This is now extremely troubling.

Sent from my iPhone

Begin forwarded message:

WSJ sources: GBW lanes closed for political retaliation By PolitickerNJ Staff<http://www.politickernj.com/author/Politicker%20Staff> | October 2nd, 2013 - 10:27am Share on facebook<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on twitter<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on favorites<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on print<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> | More Sharing ServicesMore<http://addthis.com/bookmark.php?v=250&username=xa-4b397e5b5422fea1>

The Wall Street Journal is reporting<http://online.wsj.com/article/SB10001424052702304373104579109860563887326?mg=reno64-wsj.html?dsk=y> last month's closure of lanes on the George Washington Bridge is being seen by some in Bergen County as political retribution by New Jersey's Republican governor.

The report suggests Fort Lee's Democratic mayor was retaliated against for not having endorsed Gov. Chris Christie's re-election bid.

Local access lanes to the GWB were closed last month for multiple days for the Port Authority – which is jointly controlled by Christie and New York Gov. Andrew Cuomo – to perform a traffic study. However, people familiar with the dispute told the Wall Street Journal no study was conducted.

The lane closures triggered "massive congestion in Fort Lee for four straight weekdays" and ended abruptly after the authority's executive director fumed about the closure in an email and said the move likely broke state and federal laws, according to the report.

Christie's campaign labeled the suggestion the closure was retaliation as "crazy."

****

Please Note: The information contained in this email message is a PRIVATE communication that may contain confidential attorney-client information. If you are not the intended recipient, do not read, copy or use it or disclose it to others. If you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.

Thank you.

****

IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.

****

Rechler, Scott

From:	David Garten
Sent:	Saturday, December 14, 2013 8:30 AM
To:	Rechler, Scott
Subject:	NY Times with important DW mention

Note the DW that I bolded. It's the first major mention about DW getting a lot of his scoops when CC was a US Attorney.

December 13, 2013

Christie Views Lane Closings on George Washington Bridge as)verblown

By KATE ZERNIKE

TRENTON — It began with a few orange traffic cones in September, when local access lanes to the George Washington Bridge abruptly closed for four days, gridlocking Fort Lee, N.J.

But after legislative hearings, the resignations of two of his confidants and demands for more answers, the allegation that drivers were made to suffer for the sake of petty political payback has grown into a major irritation for Gov. Chris Christie.

Facing reporters on Friday to announce the resignation of a second close associate in a week, Mr. Christie said the fuss about the two men's having ordered that lanes leading to the George Washington Bridge be shut — and whether they had done it to punish Fort Lee's mayor for failing to endorse Mr. Christie — had been "sensationalized."

It was merely a mistake, he said, or rather, "a mistake got made." The article that said he had called Gov. Andrew M. Cuomo of New York to complain that the controversy was getting too much attention? "The story was wrong." The resignation yesterday, by the man at the Port Authority of New York and New Jersey, which controls the bridge? "This was a change I was going to make anyway," Mr. Christie said.

But to explain that it was not such a big deal, the governor spent more than an hour of his time. And he said he had watched "most of" the hearing this week that laid out the details of the closings — a hearing that had stretched for more than six hours.

PA - GWB - 008524

Even if the lane closings were not retribution, even if Mr. Christie did not know about them, the accusation of nasty politics goes to the heart of one of the governor's vulnerabilities as he prepares to run for president. In how many other states, after all, do pollsters routinely ask voters whether they agree that their governor is a bully?

So Mr. Christie, among the deftest of politicians, took pains to put any tone of bullying aside. His normally combative self, the wagging finger and borderline contempt for reporters, was gone, replaced by a charmer, widening his eyes and offering extensive explanation.

The "culture of fear" that workers described at the Port Authority? "The first I've heard of it," he said, and shrugged.

Punishing the mayor of Fort Lee? "I don't have any recollection of having met the mayor of Fort Lee," he said. (Twitter then exploded with copies of a photo of the governor with the mayor, Mark Sokolich, a Democrat.)

Is there a bottom of this story to get to? "I don't think so," Mr. Christie said, shrugging again. He added, "We're going to turn the page now."

Mr. Christie understands the stakes: that as a leading contender for the Republican presidential nomination, Democrats and the news media will watch his every move. ("Get used to the new world," he told one reporter on Friday, smiling.)

He was not quite taking responsibility: more like putting distance. The lanes had been closed, he said twice, "at the request of Mr. Wildstein" — David Wildstein, an old friend of Mr. Christie's, who resigned from his $150,000-a-year job at the Port Authority a week ago.

Asked about Bill Baroni, another close friend and the governor's chief appointee at the Port Authority until he resigned on Friday, Mr. Christie said he had not spoken to him "in the last period of time."

By the end of the hour, the governor tried to turn the situation to his advantage, offering that he wished more people in public life would own up to their mistakes. His office followed up by emailing a video clip from the news conference headlined, "I Take Responsibility for Things That Happen on My Watch." It opened with him saying, "I wouldn't characterize myself as angry."

National Democratic groups had jumped on the controversy after details of the moves by Mr. Baroni and Mr. Wildstein came out at a legislative hearing here Monday, and Democrats in the State Legislature said their investigations would continue. Assemblyman John Wisniewski, who led the hearing Monday, said he expected more hearings to follow up on seven subpoenas he sent on Thursday, including for email correspondence between the governor's office and the Port Authority. That agency's inspector general is also investigating.

"We still don't have a full accounting of what happened, why it was allowed to occur, everyone who was involved and what their motivations were," said State Senator Loretta Weinberg, the Democratic majority leader, who has attended Port Authority meetings in recent months to seek answers. She called the resignations "an admission of guilt."

Mr. Baroni, who earned $291,100 at the Port Authority in 2011, is a former Republican state senator who was appointed by Mr. Christie in the face of a primary challenge for his legislative seat. **At the Port Authority, he created a new job for Mr. Wildstein, who was a high school friend of the governor and who later became mayor of their hometown, Livingston, and started an anonymous political blog that was noted for scoops from the United States attorney's office when Mr. Christie led it.**

Port Authority workers testified on Monday that the lane closings had caused emergency vehicles to be delayed, commutes to stretch to four hours and children to be late to the first day of school. It cost the agency toll revenue and overtime pay.

Mr. Wildstein, the workers said, told them not to tell anyone about the closings, and had not followed procedure for such significant changes to traffic patterns — 75,000 cars use those lanes each day. The Port Authority workers said they had gone along with the plan despite warning it would "not end well"; they said they had feared for their jobs, because Mr. Wildstein worked for Mr. Baroni, and Mr. Baroni worked for the governor.

If there was a traffic study, the workers testified, it had not resulted in any report that they knew of.

Mr. Christie said, "I've heard more about this than I ever wanted to," and said he had better ways of spending Friday mornings than talking for an hour about traffic studies and road closings. Still, at the end of the news conference, in which he named a former prosecutor and close aide of his, Deborah Gramiccioni, to Mr. Baroni's post, Mr. Christie suggested it might be worth examining why Fort Lee should have local access lanes.

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Rechler, Scott

From: Rechler, Scott
Sent: Saturday, December 14, 2013 8:38 AM
To: 'David Garten'
Subject: RE: NY Times with important DW mention

Interesting.

From: David Garten
Sent: Saturday, December 14, 2013 8:30 AM
To: Rechler, Scott
Subject: NY Times with important DW mention

Note the DW that I bolded.

December 13, 2013

Christie Views Lane Closings on George Washington Bridge as Overblown

By KATE ZERNIKE

TRENTON — It began with a few orange traffic cones in September, when local access lanes to the George Washington Bridge abruptly closed for four days, gridlocking Fort Lee, N.J.

But after legislative hearings, the resignations of two of his confidants and demands for more answers, the allegation that drivers were made to suffer for the sake of petty political payback has grown into a major irritation for Gov. Chris Christie.

Facing reporters on Friday to announce the resignation of a second close associate in a week, Mr. Christie said the fuss about the two men's having ordered that lanes leading to the George Washington Bridge be shut — and whether they had done it to punish Fort Lee's mayor for failing to endorse Mr. Christie — had been "sensationalized."

It was merely a mistake, he said, or rather, "a mistake got made." The article that said he had called Gov. Andrew M. Cuomo of New York to complain that the controversy was getting too much attention? "The story was wrong." The resignation yesterday, by the man at the Port Authority of New York and New Jersey, which controls the bridge? "This was a change I was going to make anyway," Mr. Christie said.

But to explain that it was not such a big deal, the governor spent more than an hour of his time. And he said he had watched "most of" the hearing this week that laid out the details of the closings — a hearing that had stretched for more than six hours.

Even if the lane closings were not retribution, even if Mr. Christie did not know about them, the accusation of nasty politics goes to the heart of one of the governor's vulnerabilities as he prepares to run for president. In how many other states, after all, do pollsters routinely ask voters whether they agree that their governor is a bully?

So Mr. Christie, among the deftest of politicians, took pains to put any tone of bullying aside. His normally combative self, the wagging finger and borderline contempt for reporters, was gone, replaced by a charmer, widening his eyes and offering extensive explanation.

The "culture of fear" that workers described at the Port Authority? "The first I've heard of it," he said, and shrugged.

Punishing the mayor of Fort Lee? "I don't have any recollection of having met the mayor of Fort Lee," he said. (Twitter then exploded with copies of a photo of the governor with the mayor, Mark Sokolich, a Democrat.)

Is there a bottom of this story to get to? "I don't think so," Mr. Christie said, shrugging again. He added, "We're going to turn the page now."

Mr. Christie understands the stakes: that as a leading contender for the Republican presidential nomination, Democrats and the news media will watch his every move. ("Get used to the new world," he told one reporter on Friday, smiling.)

He was not quite taking responsibility: more like putting distance. The lanes had been closed, he said twice, "at the request of Mr. Wildstein" — David Wildstein, an old friend of Mr. Christie's, who resigned from his $150,000-a-year job at the Port Authority a week ago.

Asked about Bill Baroni, another close friend and the governor's chief appointee at the Port Authority until he resigned on Friday, Mr. Christie said he had not spoken to him "in the last period of time."

By the end of the hour, the governor tried to turn the situation to his advantage, offering that he wished more people in public life would own up to their mistakes. His office followed up by emailing a video clip from the news conference headlined, "I Take Responsibility for

Things That Happen on My Watch." It opened with him saying, "I wouldn't characterize myself as angry."

National Democratic groups had jumped on the controversy after details of the moves by Mr. Baroni and Mr. Wildstein came out at a legislative hearing here Monday, and Democrats in the State Legislature said their investigations would continue. Assemblyman John Wisniewski, who led the hearing Monday, said he expected more hearings to follow up on seven subpoenas he sent on Thursday, including for email correspondence between the governor's office and the Port Authority. That agency's inspector general is also investigating.

"We still don't have a full accounting of what happened, why it was allowed to occur, everyone who was involved and what their motivations were," said State Senator Loretta Weinberg, the Democratic majority leader, who has attended Port Authority meetings in recent months to seek answers. She called the resignations "an admission of guilt."

Mr. Baroni, who earned $291,100 at the Port Authority in 2011, is a former Republican state senator who was appointed by Mr. Christie in the face of a primary challenge for his legislative seat. **At the Port Authority, he created a new job for Mr. Wildstein, who was a high school friend of the governor and who later became mayor of their hometown, Livingston, and started an anonymous political blog that was noted for scoops from the United States attorney's office when Mr. Christie led it.**

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Mr. Wildstein, the workers said, told them not to tell anyone about the closings, and had not followed procedure for such significant changes to traffic patterns — 75,000 cars use those lanes each day. The Port Authority workers said they had gone along with the plan despite warning it would "not end well"; they said they had feared for their jobs, because Mr. Wildstein worked for Mr. Baroni, and Mr. Baroni worked for the governor.

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From:	David Garten
Sent:	Saturday, December 14, 2013 8:43 AM
To:	Rechler, Scott
Subject:	Re: NY Times with important DW mention

Yeah, I've already done some digging on the new DED coming in, Deborah. She has a history of cleaning up some of the mess that CC has gotten himself in and I expect her to play a similar role, particularly in making sure that any investigation, as well as materials submitted to Wiz will keep CC clean.

On Sat, Dec 14, 2013 at 8:37 AM, Rechler, Scott wrote:

Interesting.

From: David Garter
Sent: Saturday, December 14, 2013 8:30 AM
To: Rechler, Scott
Subject: NY Times with important DW mention

Note the DW that I bolded. It's the first major mention about DW getting a lot of his scoops when CC was a US Attorney.

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Sent: Tuesday, December 17, 2013 6 08 PM
To: Tragale, Ralph
Subject: FW: Port Authority Nightly Media Activity Report 12/17/13

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Sent: Tuesday, December 17, 2013 6:07 PM
To: 'srechler' ; Foye, Patrick; Danielides, Philippe; Ma, John; MacSpadden, Lisa; Coleman, Steve; Simon, Brian; Lado, Tina; Buchbinder, Darrell; 'michael.drewniak ; 'Joshua.Vlasto(Garten, David
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From: Marsico, Ron
Sent: Tuesday, December 17, 2013 6:08 PM
To: Valens, Chris; Hayes, Anthony, King, Rudolph; Albiez, Cheryl Ann; Pentangelo, Joseph, Shapiro, Evelyn, Rodrigues, Lenis; Van Praagh, Ian
Subject: FW Port Authority Nightly Media Activity Report 12/17/13

From: Marsico, Ron
Sent: Tuesday, December 17, 2013 6:07 PM
To: 'srechler@ ' Foye, Patrick; Danielides, Philippe; Ma, John: MacSpadden, Lisa; Coleman, Steve; Simon, Brian; Lado, Tina; Buchbinder, Darrell; 'michael.drewniak@ ; 'Joshua.Vlasto@ , Garten, David
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From: Foye, Patrick
Sent: Monday, September 16, 2013 12:21 PM
To: 'srechler(Garten, David
Subject: Fw: Wall Street Journal inquiry -- Fort Lee toll booths

Fyi

From: Coleman, Steve
Sent: Monday, September 16, 2013 12:18 PM
To: Foye, Patrick; Baroni, Bill
Cc: Ma, John; Wildstein, David; MacSpadden, Lisa
Subject: Wall Street Journal inquiry -- Fort Lee toll booths

WSJ reporter Ted Mann called, looking to do a story on the Fort Lee toll booth issue. Ted said that some Wall Street Journal editors commute to work via the GWB and through the toll booths in question and became stuck in the traffic last week. They initially were unsure of what was going on until they read John Cichowski's stories in the Bergen Record. Ted has questions about the traffic study that was referenced in Cichowski's stories and what prompted the closing of the toll booths.

Please advise on how we should respond.

[redacted]

From: Coleman, Steve
Sent: Wednesday, November 06, 2013 10:55 AM
To: Samson, David; 'srechler   i'; Foye, Patrick; Baroni, Bill
Cc: Wildstein, David; Ma, John; MacSpadden, Lisa; Danielides, Philippe; Garten, David
Subject: Wall Street Journal story/GWB

All:

We were contacted this morning by Ted Mann of the Wall Street Journal, who informed us that he is writing another story about the September closing of the GWB local access lanes. The story will be published tomorrow. Ted told us that the story will lead with a description of David Wildstein's order to Bob Durando and Cedrick Fulton to close the local access lanes on the bridge in early September and also will note that David visited the bridge that Monday morning – the first day of the closings -- to make sure the order was carried out and to observe the traffic conditions. The story will further refute any notion that this was part of a traffic study. Ted is looking to give several people in the Port Authority leadership an opportunity to comment, including the chair, vice chair, Pat, Bill, David, Bob Durando and Cedrick. Ted also mentioned that he may try to reach these individuals through other means. We will not respond to this inquiry unless directed to do so.

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Sent: Tuesday, December 17, 2013 6:07 PM
To: 'srechler; ;Foye, Patrick; Danielides, Philippe; Ma, John; MacSpadden, Lisa; Coleman, Steve; Simon, Brian; Lado, Tina; Buchbinder, Darrell; 'michael.drewniak ; 'Joshua.Vlasto , Garten, David
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Sent: Tuesday, December 17, 2013 6:07 PM
To: Foye, Patrick; Danielides, Philippe; Ma, John; MacSpadden, Lisa; Coleman, Steve; Simon, Brian; Lado, Tina; Buchbinder, Darrell; 'michael.drewniak('; 'Joshua.Vlasto Garten, David
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From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 5:22 PM
To: Ma, John
Subject: Fw: Record story

Sent from my BlackBerry 10 smartphone on the Verizon Wireless 4G LTE network.

From: MacSpadden, Lisa
Sent: Friday, December 6, 2013 5:10 PM
To: Scott Rechler; Foye, Patrick; Garten, David
Subject: Record story

David Wildstein, the agency's director of Insterstate Capital Projects, submitted his resignation letter Friday, days before a legislative hearing to investigate the lane closures. Wildstein said he plans to leave on Jan. 1 "to pursue other opportunities."

"My plan was to leave the agency at some point next year, but the Fort Lee issue has been a distraction, and I think it's better to move on earlier," he wrote in a letter to the agency's Deputy Executive Director, Bill Baroni. "I am grateful to you and Governor Christie for the opportunity to serve."

News of Wildstein's resignation came on the same day two more Port Authority officials were ordered to testify before New Jersey lawmakers on Monday about the unannounced lane closures in September.

The legislative panel sent subpoenas to Cedric Fulton, the Port Authority's director of tunnels, bridges and terminals, and Robert Durando, the manager of the Fort Lee bridge, ordering them to appear before a committee investigating whether the lane closures were politically motivated to punish Fort Lee's mayor.

A spokesman for Democratic Assemblyman John Wisniewski, chairman of the transporation committee, confirmed on Friday afternoon that both officials were summoned to Trenton to tesify Monday. It's not clear if the officials intend to comply; a Port Authority spokesman did not immediately respond to a request for comment.

Wildstein would not comment beyong announcing his resignation.

The hearing threatens to expose divisions within the bi-state agency between governors on both sides of the Hudson. The lane closures, which caused heavy traffic delays in Fort Lee, were ordered by Wildstein without notification to the public, local officials, or the agency's executive director.

The executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, has said he intends to testify after he received a subpoena last week.

Foye called the closures "abusive" and said they were potentially illegal in an internal e-mail that was leaked to the media. Earlier this week, while saying he intended to testify, he said he stands by the e-mail. The Fort Lee Mayor, Mark Sokolich, intially said he believed the closures were "punitive" but has since backed away from that statement. Sokolich, a Democrat, was asked to endorse Christie for re-election in September but declined.

Christie previously called the notion that it was political retribution "crazy." His top appointee at the agency, Bill Baroni, testified before the same panel last week and said the lane closures were part of a simple traffic study to determine whether too many toll lanes are dedicated to traffic from a local access ramp.

- See more at:
http://www.northjersey.com/news/More_Port_Authority_officials_ordered_to_testify_on_GWB_lane_closures.html#sthash.XXIMQoYT.mtARY8VP.dpuf

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Coleman, Steve

From: Coleman, Steve
Sent: Wednesday, November 06, 2013 10:55 AM
To: Samson, David; 'srechler: Foye, Patrick; Baroni, Bill
Cc: Wildstein, David; Ma, John; MacSpadden, Lisa; Danielides, Philippe; Garten, David
Subject: Wall Street Journal story/GWB

All:

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Sent: Wednesday, November 06. 2013 10:55 AM
To: Samson, David; 'srechler(_ Foye, Patrick; Baroni, Bill
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Valens, Chris

From: Marsico, Ron
Sent: Tuesday, December 17, 2013 6:08 PM
To: Valens, Chris; Hayes, Anthony; King, Rudolph; Albiez, Cheryl Ann; Pentangelo, Joseph; Shapiro, Evelyn; Rodrigues, Lenis; Van Praagh, Ian
Subject: FW: Port Authority Nightly Media Activity Report 12/17/13

From: Marsico, Ron
Sent: Tuesday, December 17, 2013 6:07 PM
To: 'srechler(Foye, Patrick; Danielides, Philippe; Ma, John; MacSpadden, Lisa; Coleman, Steve; Simon, Brian; Lado, Tina; Buchbinder, Darrell; 'michael.drewniak('Joshua.Vlasto(Garten, David
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Rechler, Scott

From:	David Garten
Sent:	Wednesday, December 11, 2013 8:18 PM
To:	Rechler, Scott
Subject:	Samson story in Bergen Record (including published emails - see attached)
Attachments:	PPT.pdf; more engineering emails.pdf; Durando emails.pdf; engineering email.pdf

Port Authority chairman silent on GWB lane closure controversy

WEDNESDAY, DECEMBER 11, 2013 LAST UPDATED: WEDNESDAY DECEMBER 11, 2013, 8:07 PM

BY SHAWN BOBURG
STAFF WRITER

THE RECORD

PRINT | E-MAIL

MITSU YASUKAWA / STAFF PHOTOGRAPHER

From left, Port Authority Deputy Executive Director Bill Baroni, Chairman David Samson and Chief Financial Officer Michael Fabiano meeting with The Record editorial board in October 2012.

Related: Fort Lee Trial Review presentation *(PDF)*

When there were three-hour backups on the Outerbridge Crossing and Goethals Bridge in April 2011, the chairman of the Port Authority, a close advisor to Governor Christie, came down hard on the executives who run the agency.

"We consider this unacceptable," David Samson said publicly at the time. "It's unthinkable that we would have these problems."

Two-and-a-half years later, though, Samson is steering clear of another traffic jam — this one created by a Christie appointee who ordered an unannounced study on the George Washington Bridge in September that temporarily turned Fort Lee into a parking lot and has led to speculation that the world's busiest bridge was used as a tool to exact political revenge.

Related: Email from Port Authority engineer Jennifer Bates to GWB manager Robert Durando *(PDF)*

Samson remained silent on Tuesday, even as the Port Authority's Inspector General announced he had launched an investigation to see if there was criminal wrongdoing. National Democrats began taking shots at Christie, signaling they see the bridge flap as potentially damaging to his potential rise to higher office. And New York legislators called for the resignation of Christie's top executive appointee at the agency, Deputy Executive Director Bill Baroni.

Samson, the agency's top policy official, has been in the shadows through the improbable traffic-cone controversy. He hasn't returned phone messages or e-mails this week, and on Wednesday, he declined to talk to a reporter at his law office in West Orange. For the last two months, he has also inexplicably and uncharacteristically skipped the press conferences held after the commissioners' monthly meetings when reporters asked questions about the issue.

Related: Email chain between engineers, Port Authority's David Wildstein and GWB staff *(PDF)*

It's a break from the past.

For decades, the Port Authority's chairman and executive director have taken the lead when responding to public controversies, said Princeton professor Jameson W. Doig, who wrote a book about the history of the agency. Perhaps none of those past controversies have seemed so small on the surface as a decision to merge two lanes. But Samson's retreat may reflect the Christie's administration's uncertainty about how to handle the potential scandal.

Christie, who has laughed off questions about the incident as much ado about traffic cones, has not responded to multiple requests for comment since Monday's sworn testimony by two Port Authority officials that David Wildstein, a high school classmate of the governor and a powerful agency official, ordered the study on short notice and told one bridge worker to keep it a secret from the commuting public and local officials in Fort Lee, even borough police.

Related: Email chain between engineers, Port Authority's David Wildstein and GWB staff *(PDF)*

The Port Authority officials called the study "odd" and "unprecedented" and said they warned Wildstein it would end badly. And the agency's top executive from New York said he thought the lane closings were abusive and illegal. Even before their testimony, Wildstein had agreed to step down late last week, calling the issue "a distraction." Internal e-mails obtained by The Record do show that Wildstein asked the agency's traffic engineers to conduct a study of some sort, although the records also show that those engineers predicted the chaos in Fort Lee beforehand. Wildstein told them to do it anyway.

It's unclear if Samson knew about the study or has inquired about it since.

He holds a singular position in an agency whose power structure is diffuse and complex: The governors of New York and New Jersey each make appointments to the 12-member board of commissioners, as well as the top two executives responsible for running the agency day-to-day. They oversee a workforce of long-term technocrats skilled in transportation, commerce and real estate.

Since becoming a Port Authority commissioner, Samson has led initiatives to make the agency more transparent, but he also presided over the approval of the largest ever toll hikes, criticized for being rushed without enough public input. But Samson, a former New Jersey Attorney General who Christie often refers to as "The General," has been its public face as much as anyone. He has also has strong ties to Christie outside the agency.

He led the governor's 2010 transition team when he came into office. A few of Christie's former cabinet members, including former U.S. Senator Jeffrey Chiesa, either previously worked or now work at Samson's law firm, Wolff Samson. He also was among the group of close advisors who went to Arizona with Christie last month when he took on his new position as chairman of the Republican Governors Association, a sign that Samson is seen as important to Christie's potential run for national office.

Democrats, sensing weakness, have begun seizing on the bridge flap.

"Chris Christie and his administration need to come clean on the facts," a spokesperson for a recently launched political action committee, Correct the Record, said Wednesday about the controversy. The group says its mission is to defend Democratic presidential candidates and hold Republicans accountable. The National Democratic Committee issued similar statements Tuesday and Wednesday, reflecting Christie's role as an early frontrunner for the 2016 Republican presidential nomination.

Attacks are also coming from across the Hudson. Three Democratic lawmakers from New York — state Sen. Adriano Espaillat, Assembly member Gabriella Rosa and New York City Council member Ydanis Rodriguez — issued a statement calling for Baroni's resignation on Wednesday.

"We cannot tolerate the disturbing precedent set by Mr. Baroni's actions – that taxpayer-funded infrastructure can be used to settle personal and political feuds," they said.

And Michael Nestor, from the Port Authority Inspector General's Office, the independent investigative arm of the agency, said Wednesday the office had begun an investigation.

"We want to know, No. 1, how and why did this happen; No. 2, who was behind it all, and No. 3, was there any criminal violation?" Nestor said.

Meanwhile, Samson's secretary at his law firm said he was in a meeting and would be unavailable all day.

In the past, Samson has not shied away from the public stage. Although, commissioners' meetings are usually staid affairs with little discussion or disagreement, Samson has on occasion acknowledged the Port Authority's reputation for being unresponsive to the public, as he did when he criticized the April 2011 traffic jams at the bridges that connect New Jersey to Staten Island. At the time, he excoriated Executive Director Christopher O. Ward, a New York appointee, for a shortage of toll collectors that led to the massive delays on a busy holiday in 2011.

Wildstein, the official who ordered the traffic study, has not suffered the same fate. He received praise from a Christie spokesman on Friday, after announcing he would resign from his $150,000 job as director of interstate capital projects, effective Jan. 1.

The only answers from Christie's camp have come from Baroni. He told skeptical legislators at a separate hearing two weeks ago that the exercise was a simple traffic study. He was not under oath. And his testimony was at odds with Monday's sworn testimony by the three officials who were subpoenaed.

E-mails obtained by The Record do indicate that Wildstein took steps to perform a study of some kind — although agency officials testified Monday that the process for a study typically starts years, not days, in advance.

The e-mails show that on Aug. 29 the agency's chief traffic engineer, Jose Rivera sent Wildstein and the agency's chief engineer, Peter Zipf, four slides showing different configurations on the bridge plaza, including merging three access lanes into one. On Friday, Sept. 6, Wildstein ordered engineers to put the plan in place on the following Monday. Zipf sent another e-mail to Rivera and three others that day asking for "daily summaries of Traffic impacts--both positive and negative." Engineers did so.

At just after 5 p.m. on Thursday, Daniel Jacobs, a manager in the department that oversees tunnels and bridges, emailed Mark Muriello, another high-ranking employee within the department, a document entitled, "Reallocation of Toll Lanes at the GWB: An EARLY assessment of the benefits of the trial."

The report said the combined delays experienced by motorists from the Fort Lee totaled 2,800 hours during the four busiest morning commuting hours, while Route 95 traffic saved a total of only 966 combined hours over that time. However, the amount of cars that use the I-95 approach far exceeds those that use the local approaches. The report referenced the predictions, made prior to the test, of traffic lines on Fort Lee streets 600 vehicles long. Those lines were predicted to last until noon. "This matches actual performance observed by GWB management," the report states.

Email: boburg@northjersey.com

- See more at:
http://www.northjersey.com/news/Port_Authority_chairman_silent_on_GWB_lane_closure_controversy.html?page=all#sthash.qVNmph9W.dpuf

Rechler, Scott

From:	David Garten
Sent:	Wednesday, November 27, 2013 4:40 PM
To:	Rechler, Scott
Subject:	Re: Pat has been subpoenaed

Ted Mann's piece on the subpoena:

Port Official Subpoenaed in George Washington Bridge Flap

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By

- TED MANN
- CONNECT

Peter J. Smith for The Wall Street Journal

Assemblyman Chairman John S. Wisniewski, right, responds to questions at a hearing earlier this week.

A leading New Jersey lawmaker subpoenaed the executive director of the Port Authority of New York and New Jersey Wednesday, saying the bi-state agency has yet to sufficiently explain the motives behind the closures of traffic lanes onto the George Washington Bridge in September.

Assemblyman John Wisniewski, a Democrat who chairs the transportation committee, issued the subpoena Wednesday to Patrick Foye, an appointee of New York Gov. Andrew Cuomo who was responsible for reversing the lane closures and who warned fellow authority executives in writing that the move might have violated federal law.

The subpoena compels Mr. Foye to appear before the committee on Dec. 9 and also to provide a wide range of documents and correspondence showing the reason for the closures, details of their impact on the region's economy, and any correspondence between Gov. Chris Christie's administration and the authority concerning the lane closure plans.

The closures were ordered by David Wildstein, an authority employee and veteran political operative who is a political ally of Mr. Christie's. Mr. Wisniewski and others have said they are trying to determine if their purpose was not to study traffic — as the authority has said — but to punish the Democratic mayor of Fort Lee, N.J., by inundating the small borough in backed-up bridge traffic.

Mr. Christie's reelection campaign spokesman called that notion "crazy."

Mr. Wisniewski's decision to subpoena Mr. Foye answers an outstanding question: Did the testimony of Bill Baroni, the deputy executive director of the authority and another Christie appointee, blunt the momentum of Democratic lawmakers who want to investigate the matter?

In a combative appearance Monday before Mr. Wisniewski's committee, Mr. Baroni apologized for the authority's failure to notify Fort Lee officials about the lane closures before they occurred, but also sought to turn the tables on his questioners. The purpose of Mr. Wildstein's order to close the lanes was to study whether it was fair to have them in the first place, Mr. Baroni said. Since Fort Lee residents make up fewer than 5% of motorists crossing the bridge daily, he asked rhetorically, did it make sense to allow the town three dedicated toll lanes out of the 12 that run onto the upper roadway on the bridge?

"Mr. Baroni's unprofessional testimony created many more unanswered questions," Mr. Wisniewski said in announcing the subpoena. "It's important for the Legislature to understand the circumstances surrounding these lane closures, as the impact on emergency services from the inexplicable lack of notification could have resulted in the loss of life. It's also now more than two months after the closure and no clear and convincing information has been forthcoming on how this decision was made and why it was suddenly necessary."

More In George Washington Bridge

- Hearings Sought in New York on George Washington Bridge Lane Closures
- Port Official Explains Bridge Lane Closure Before Skeptical Lawmakers
- Port Officials Say Little About September's George Washington Bridge Lane Closures
- Lawmakers Seek Subpoenas in George Washington Bridge Investigation
- Politician Looking for Answers in George Washington Bridge Jam

In issuing the subpoena to Mr. Foye, rather than to Mr. Wildstein or other authority officials, Mr. Wisniewski singles out the authority executive who most explicitly denounced the lane closures. In an email reviewed by The Wall Street Journal, Mr. Foye angrily ordered the lane closures reversed, told fellow leaders of the agency that key officials had not been warned of the impending traffic pattern changes, and openly worried that ambulance patients could have died after being caught in the snarls of traffic that backed up on the New Jersey side of the bridge.

Mr. Foye is also a high-ranking appointee of Mr. Cuomo, who shares control of the massive, bi-state authority.

Mr. Cuomo has yet to address the lane closure dispute. His spokesman did not immediately return a request for comment.

But pressure has continued to build for a more complete explanation of the incident. New York Sen. Adriano Espaillat, whose district sits on the New York side of the bridge, called Monday for legislative hearings in Albany on the matter.

And also Wednesday, New Jersey Sen. Richard Codey wrote to the authority's inspector general to request a formal investigation into the lane closures and their purpose.

"Numerous questions have surfaced surrounding the events leading up to the sudden closure of these lanes ranging from, at worst, political motivations to retaliate against a local mayor, to at best, the desire to undertake a traffic study," Mr. Codey wrote. "What is certain is that the residents of Fort Lee and surrounding communities were adversely impacted without warning during the time of the closures and law enforcement was not provided any warning or information to prepare which put the safety of commuters at risk."

Michael Nestor, the inspector general's director of investigations, confirmed receipt of Mr. Codey's request, but did not comment further.

On Wed, Nov 27, 2013 at 3:33 PM, David Garten ‹ 1> wrote:

Wisniewski Subpoenas Port Authority of NY & NJ Executive Director to Explain George Washington Bridge Lane Closures

Orders PANYNJ Chief to Appear at Special Dec. 9 Hearing in Trenton

(TRENTON) - Assembly Deputy Speaker John Wisniewski on Wednesday subpoenaed the Port Authority of New York and New Jersey's executive director to attend a special December hearing on the agency's finances and its decision to close lanes to the George Washington Bridge in Fort Lee.

Wisniewski (D-Middlesex), the Assembly transportation committee chairman, ordered Patrick Foye, the authority's executive director, to appear at a special Dec. 9 hearing in Trenton.

The subpoena comes after the authority's deputy director, Bill Baroni, refused on Monday to directly answer many committee questions on the lane closures and provide data to support his testimony.

"Mr. Baroni's unprofessional testimony created many more unanswered questions," said

Wisniewski (D-Middlesex). "It's important for the Legislature to understand the circumstances surrounding these lane closures, as the impact on emergency services from the inexplicable lack of notification could have resulted in the loss of life. It's also now more than two months after the closure and no clear and convincing information has been forthcoming on how this decision was made and why it was suddenly necessary."

Foye is ordered to appear for the 10 a.m., Dec. 9 hearing at the State House and produce documents, correspondence, books, papers and other writings requested by the panel.

"The committee has a responsibility to its constituents to obtain answers to these questions and ensure that protections are in place to guarantee such an event will not happen again," Wisniewski said. "We need to know whether this was incompetence or political mischief by political appointees. A more public and thorough discussion of these issues is necessary, and I look forward to Mr. Foye's input."

Under the subpoena, Foye is compelled to appear to testify and asked to produce:

· All documents and correspondence, produced between Jan. 1, 2013 and the present date between Gov. Chris Christie or any member of his administration and/or any employee, officer, or executive of the Port Authority, concerning the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013;

· All documents and correspondence, produced between Jan. 1, 2013 and the present date, between and among employees, executives, or officers of the Port Authority, including any documents and correspondence sent or received by David Wildstein, Director of Interstate Capital Projects concerning the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013;

· All documents and correspondence referenced and cited to by Baroni at Monday's Assembly Transportation, Public Works and Independent Authorities Committee meeting, including, but not limited to, any traffic count, traffic report, or traffic study, produced by any employee, executive, or officer of the Port Authority or any third party working on behalf of any employee, executive, or officer of the Port Authority related to the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013;

· All documents and correspondence supporting Mr. Baroni's assertion at the Monday New Jersey Assembly Transportation, Public Works and Independent Authorities Committee meeting that: (a) on Tuesday, Sept. 10, 2013 the General Manager of the George Washington Bridge noted a four minute reduction in travel time for commuters using the I-95 approach to the George Washington Bridge and a three minute reduction in travel time for commuters using local road approaches to the George Washington Bridge; (b) on Wednesday, Sept. 11, 2013 the General Manager of the George Washington Bridge noted a reduction in travel time for commuters using the I-95 approach and the local road approaches to the George Washington Bridge; and (c) 105,000 regular EZ-Pass users cross the George Washington Bridge each morning and 4,839 of those users are from Fort Lee, New Jersey;

· Copies of all rules, regulations, or written policies of the Port Authority concerning the process for closing access lanes to the George Washington Bridge. Copies of all rules, regulations, or written policies of the Port Authority concerning the process for approving and conducting traffic studies, including, but not limited to any rules, regulations, or written policies concerning public and law enforcement notification of lane closures in relation to traffic studies; and

· All information concerning the impact on toll collections or any other economic impact to the Port Authority or the New York, New Jersey Metropolitan Region resulting from the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013.

Rechler, Scott

From:	Rechler, Scott
Sent:	Tuesday, November 26, 2013 5:44 AM
To:	David Garten
Subject:	Re: New Ted Mann article - says that New York Sen. Adriano Espaillat wrote to Albany yesterday
Attachments:	NY-CS058_BRIDGE_D_20131125194035.jpg

Interesting. Who is Espaillat? What area does he represent?

Scott Rechler
CEO and Chairman
RXR Realty

On Nov 26, 2013, at 5:38 AM, "David Garten" < > wrote:

Bridge Lane Closures Are Questioned

Port Authority Official Defends Agency's Decision, but Apologizes for Failing to Alert Others

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An official from the Port Authority of New York and New Jersey, appearing before a skeptical committee of the New Jersey state Assembly on Monday, defended the agency's temporary closure of local access lanes onto the George Washington Bridge in September, while apologizing for failing to alert local officials and executives within the authority itself.

Bill Baroni, deputy executive director of the bi-state authority, said the closures arose from an internal effort to gauge the "fairness" of having local access lanes specifically for the borough of Fort Lee, N.J., since the community sends only a fraction of the daily traffic across the span into New York.

Enlarge Image
<NY-CS058_BRIDGE_D_20131125194035.jpg>
Bill Baroni, deputy executive director of the Port Authority, highlights George Washington Bridge access lanes at Monday's Assembly hearing.*Peter J. Smith for The Wall Street Journal*

"Is anybody going to argue this is fair?" Mr. Baroni asked the Assembly's transportation committee, in the first legislative hearing about the weeklong realignment of the lanes.

Some local politicians have portrayed the realignment—which caused traffic to back up severely into Fort Lee—as a political stunt, not a study.

The Democratic committee leadership was skeptical during a hearing that at times turned contentious.

The committee chairman, Assemblyman John Wisniewski, a former state Democratic Party chairman, at one point told Mr. Baroni: "You are a masterful dancer and we appreciate your dancing skills."

Assemblywoman Linda Stender, the committee's vice chairwoman, said she suspected the lane closures were a show of political muscle toward the Democratic mayor of Fort Lee, Mark Sokolich. He was asked and declined to endorse Mr. Baroni's political patron, Gov.Chris Christie, for re-election, according to people familiar with the matter.
None of the committee members asked Mr. Baroni directly if the lane closures were politically motivated.

Mr. Baroni was accompanied to the hearing by a top attorney for the authority, Philip Kwon, and Philippe Danielides, the senior adviser to Port Authority Chairman David Samson. Not attending was the official who Mr. Baroni said conceived of the lane alterations and ordered them into place: David Wildstein, the veteran political operative and a key ally of Mr. Christie within the authority.

Mr. Sokolich suggested that the closures were "punitive" in a private letter to Mr. Baroni in September, but has since recanted. He was invited to testify but didn't attend the hearing.

Mr. Christie's office didn't return a request for comment. His spokesman has said that the governor wasn't involved in questions of traffic patterns on the bridge and has referred questions to the authority. A spokesman for Mr. Christie's campaign said at the time that the notion the lane closures were political was "crazy."

Ms. Stender suggested Mr. Baroni's appearance was intended to "divert from the root question, which was, 'Was this done for political purposes, as opposed to for policy reasons?'"

"That there is not a paper trail or an email that explains the communication of how that was decided is ludicrous, and totally not believable," she said. "So it leads one to believe that somebody picked up a phone and made a phone call, and made [another] phone call because there was not legitimate purpose behind it. It was done to intimidate a mayor."

After his appearance, Mr. Baroni declined to say why he, Mr. Foye and other authority officials hadn't explained their motives before Monday's hearing—including during a press briefing last week in which Messrs. Baroni and Foye declined to answer questions because of what they said was a continuing internal review of the matter.

The results of that review were Mr. Baroni's testimony before the committee, he said. Asked why he hadn't explained sooner, he said, "It's a beautiful day to be in Trenton."

Republican lawmakers rallied to Mr. Baroni's side. Assemblyman John Amodeo accused Mr. Wisniewski of launching "unfair political attacks" in his questioning of Mr. Baroni, and Sen. Kevin O'Toole said the authority's actions had helped to lay bare a "sweetheart deal" that allows residents of Fort Lee better access to the bridge than other motorists.

Sen. Loretta Weinberg, a Democrat, released a statement criticizing Mr. Baroni's failure to provide any evidence of the origins of the traffic study as an instance of "the dog ate my homework." Mr. Wisniewski told reporters he might subpoena Mr. Wildstein, and said he expected Mr. Foye to testify eventually.

Meanwhile, New York Sen. Adriano Espaillat wrote Monday to Republican leaders in Albany, urging that New York hold its own hearings into the incident.

Mr. Baroni acknowledged that the authority should have announced the planned closures more widely.

"Communication was flawed internally, communication was flawed with our neighbors—no question," he said.

Rechler, Scott

From: Rechler, Scott
Sent: Thursday, December 05, 2013 9:26 AM
To: David Garten
Subject: Re: just in case you didn't see this in the clips

Saw it and already heard from Samson about it.

Scott Rechler
CEO and Chairman
RXR Realty

On Dec 5, 2013, at 8:37 AM, "David Garten" wrote:

Port Authority official from N.Y. to testify in controversy over lane closures at George Washington Bridge

WEDNESDAY, DECEMBER 4, 2013 LAST UPDATED: WEDNESDAY DECEMBER 4, 2013, 11:26 PM
BY SHAWN BOBURG
STAFF WRITER
THE RECORD
PRINT | E-MAIL

A top Port Authority executive from New York who privately described mysterious lane closures on the George Washington Bridge as "abusive" — and maybe even illegal — said Wednesday he plans to testify next week before New Jersey lawmakers looking into whether the world's busiest bridge was turned into a political weapon.

Monday's planned testimony by Pat Foye, New York Gov. Andrew Cuomo's top appointee at the bi-state agency, threatens to open the first public rift between Governor Christie and Cuomo, rising stars in their respective parties who have made efforts to appear friendly. But the growing controversy — and the conflicting stories by each governor's representative at the agency — seem to have put them on a collision course.

Christie's appointees have described the surprise lane closures, which caused three-hour traffic jams in September in Fort Lee, as a simple traffic study. But an internal email written by Foye has fueled speculation by Democrats that the study, quietly ordered by a top Christie appointee without any notice to the public or agency traffic experts, was payback against Fort Lee's mayor — a Democrat who did not endorse the governor in his campaign for reelection.

Related: Port Authority exec subpoenaed over GWB gridlock

On Wednesday, at the agency's monthly meeting in Manhattan, Foye said for the first time that he stood by the leaked email, in which he alleged that agency protocol was "wrongfully subverted" and that state and federal laws may have been broken. His comments Wednesday were brief, only serving to confirm his plans to testify and making reference to the Sept. 13 email. But they indicated a deep dispute that extends to Trenton and Albany.

Top executives at the agency rarely make significant announcements or comment on sensitive matters without getting approval from advisers close to each governor. A spokesman for Christie did not respond to a request for comment on Wednesday.

Standing next to Foye at the lectern was Christie's top executive, Bill Baroni, who declined to respond to his counterpart's comments during the press conference that typically follows the agency's monthly meetings. Baroni repeatedly said he had already given extensive testimony last week in a combative hearing before the state Assembly Transportation Committee in Trenton.

Foye declined an invitation to appear that day. However, the Transportation Committee issued a subpoena last week compelling him to appear on Monday. It's unclear if the subpoena power claimed by the New Jersey lawmakers applies to New York public officials. Foye did not say whether he believed he was legally compelled to go to Trenton.

A central figure in the controversy was not at the press conference: David Wildstein, a former political consultant who went to high school with Christie and wields enormous power as the agency's director of interstate capital projects. It was Wildstein who ordered the lane closures after the president of the Port Authority police union raised concerns about traffic, Baroni told the Assembly panel last week. The 1,300-member union endorsed Christie, and its president, Paul Nunziato, works closely with Wildstein.

Nunziato, who attended Wednesday's meeting, said he mentioned his concern to Wildstein "over breakfast," during one of the "hundreds" of conversations they have had about everything from public safety to traffic to police staffing levels. He was asked why the agency's traffic engineers were evidently not involved in, or informed about, the study.

"They [expletive] up everything," he said. "Do I know more than a traffic engineer? Do my guys know more? Yeah, probably, because we stand out there all day."

Nunziato called Foye's email "a load of garbage," suggesting it was an effort to undermine New Jersey's influence within the agency, which doles out cash for major public works projects on both sides of the Hudson River. The agency is currently deciding what projects it will undertake over the next 10 years, a process that often heightens interstate tensions.

"It's like the Sharks and the Jets here," Nunziato said about New York and New Jersey, a reference to rival street gangs in the musical "West Side Story."

Nunziato's union gave Christie an early endorsement last year — in January, when he stood next to the governor and said: "I know that I don't have to worry when Chris Christie says he has our back; he has been there every time."

Christie's decision to support keeping Port Authority police at the World Trade Center instead of ceding those jobs to New York City police was popular with the powerful union.

In his testimony last week, after months of silence, Baroni said the traffic study was meant to determine whether Fort Lee deserved three access lanes to tollbooths from local roads. He suggested it was an unfair allocation that slowed down traffic for the rest of New Jersey's drivers heading east across the bridge. The proportion of lanes dedicated to the Fort Lee traffic, he said, was much higher than the percentage of bridge traffic that originates in the borough.

Senate Majority Leader Loretta Weinberg, a Democrat from Teaneck, said Wednesday that analysis was flawed because drivers from throughout Bergen County and Hudson County use those access lanes.

"These lanes are not limited to the exclusive use of Fort Lee residents," she said, during her fourth appearance at a commissioners meeting since September to ask for answers to unresolved questions. "Leaving that impression was completely inappropriate."

Baroni's testimony about the traffic study also failed to satisfy Assemblyman Gordon M. Johnson, D-Englewood, who spoke at the meeting, too.

"He talked about a traffic study and fairness," he said of Baroni. "He should have began his testimony with 'Once upon a time' because it was a fairy tale."

Email: boburg@northjersey.com

- See more at:
http://www.northjersey.com/news/Port_Authority_police_union_wades_into_GWB_lane_closure_tiff.html?page=all#sthash.vMxI5oyA.dpuf

Rechler, Scott

From: David Garten ·
Sent: Monday, November 25, 2013 4:47 PM
To: Rechler, Scott
Subject: Weinberg's statement

Weinberg Responds To PA Explanation For GWB Lane Closings

In Other Words: 'The Dog Ate My Homework'
TRENTON – Senate Majority Leader Loretta Weinberg issued the following statement on Monday in response to the explanation offered by the Port Authority at today's hearing on the lane closings to the George Washington Bridge:
"After two and one-half months of stonewalling this is the best story they could come up with!
"Their so-called explanation was sketchy and evasive, reminding me of the proverbial excuse 'the dog ate my homework.' They failed to give an adequate accounting and they failed to answer the key questions.
"If the original intention was really a traffic study I expect to get the documentation, as part of my Freedom of Information request to back up that claim, including the authorization and the role of Port Authority officials in the chain of command. I also expect to have the concerns expressed by the executive director of the authority addressed, including the suggestion that the closings were possibly illegal and potentially dangerous. And the authority can't 'lawyer up' in order to refuse to turn over the findings of the supposed traffic study.
"And for the authority to try to excuse away as a lack of communication the complete failure to notify other PA officials, the local towns and the public about the lane closings is an understatement that falls far short of credibility.
"Unfortunately, today's hearing doesn't put this issue to rest. I will continue to press for answers and to push for a full accounting until the full story is learned."

PA - GWB - 005243

Rechler, Scott

From: David Garten < _ n>
Sent: Saturday, December 14, 2013 8:02 AM
To: Rechler, Scott
Subject: Article that gives brief mention of Lisa's departure - she did a great job of minimizing this

Christie ally steps down in wake of George Washington Bridge scandal

Jenna Portnoy/The Star-Ledger By **Jenna Portnoy/The Star-Ledger**

Email the author | Follow on Twitter

on December 14, 2013 at 6:50 AM, updated December 14, 2013 at 6:57 AM

TRENTON — Gov. Chris Christie's top appointee to the Port Authority of New York and New Jersey resigned Friday amid questions over whether he ordered a traffic jam **at the world's busiest bridge** as political payback.

The Republican governor accepted the resignation of Bill Baroni, the agency's deputy executive director, effective immediately, and praised the former state senator's four-year stint at the bi-state agency.

"Bill Baroni is a friend of mine, has been an outstanding public servant both in his time in the Legislature and his time at the Port Authority and I have no reason not to believe him," Christie said at a Statehouse news conference, noting their 20-year relationship dating back to the governor's days as a Morris County freeholder.

Late last month, Baroni testified before a state Assembly committee that three lanes to the George Washington Bridge in Fort Lee were closed Sept. 9 to 13 to conduct a traffic study.

"I've never said that a mistake wasn't made, but what I've said is all of the other politics swirling around it was created, was manufactured," said Christie, who took questions for nearly an hour.

State and national Democrats believe officials loyal to Christie ordered the lane closures to punish the town's Democratic mayor for failing to endorse Christie's re-election bid. The controversy led to two public hearings and the subpoena of documents and correspondence from seven agency officials.

"Mr. Baroni's resignation was overdue and a good thing for New Jersey," said Assembly transportation committee Chairman John Wisniewski (D-Middlesex), whose panel is investigating the issue. "His inability to be clear, professional and honest meant he was no longer going to be effective in his role, if he ever was effective."

The Democratic National Committee on Friday **put out a web video** attacking Christie over the issue and again questioned the governor's judgment after the news conference.

"After an hourlong performance, with a lot of his customary swagger, Christie's not answering and the people of New Jersey still deserve answers," said DNC spokesman Michael Czin, who is from Bergen County.

The governor flat-out denied that he, anyone on his staff or anyone on his campaign had anything to do with the lanes closures. Christie added he doesn't wonder why Baroni did not follow the proper protocols for ordering a traffic study.

"Believe me I've heard more about this than I ever wanted to. If you think my curiosity isn't satiated, my curiosity is more than satiated," Christie said.

Baroni did not respond to a request for comment Friday.

The governor said Baroni approved the traffic study, which has yet to surface, at the request of David Wildstein, the agency's director of interstate capital projects, who has been called Christie's eyes and ears inside the agency.

Wildstein announced his resignation last week, saying he expedited his plans to leave the agency because the bridge issue had become "a distraction."
The Wall Street Journal on Friday reported that Baroni was apparently involved in the effort to keep the lane closures quiet, **citing e-mails the newspaper reviewed.**
When Port Authority Executive Director Patrick Foye told spokeswoman Lisa MacSpadden that he planned to "get word out" about the reopening of the lanes, it prompted a quick response from Baroni, who wrote: "Pat we need to discuss prior to any communications." According to the newspaper, Foye then responded: "Bill we are going to fix this fiasco," to which Baroni said: "I am on way to office to discuss," and "There can be no public discourse."
MacSpadden, director of the Port Authority's office of media relations and an appointee of Gov. Andrew Cuomo, is also leaving the agency. She accepted a job in the private sector last month and said her plan to leave has nothing to do with the bridge flap.
State Sen. Loretta Weinberg (D-Bergen), whose district includes Fort Lee, said the issue isn't settled.
"The resignations of the two highest-ranking New Jersey officials at the Port Authority is clearly an admission of guilt, but it doesn't put an end to this story," she said. "We still don't have a full accounting of what happened, why it was allowed to occur, everyone who was involved and what their motivations were."
Christie denied a Wall Street Journal account that he contacted Cuomo to complain that Foye was too aggressive in his pursuit of the truth. "That story is categorically wrong. I didn't not have that conversation with Gov. Cuomo in any way, shape or form, and he did not have that conversation with me," Christie said.
The governor added that his pick for chairman of the agency's board, David Samson, is not leaving. He will work closely with Deborah Gramiccioni, Christie's replacement for Baroni.
Gramiccioni was already a federal prosecutor when Christie took over as U.S. attorney in 2002. After a stint working for the attorney general under Gov. Jon Corzine, she later became part of Christie's senior staff when he took office.

Rechler, Scott

From: David Garten ‹ ›
Sent: Monday, December 09, 2013 1:28 PM
To: Rechler, Scott
Subject: Engineering emails leaked to Bergen Record

Documents show Port Authority knew GWB lane closures would cause major trouble for commuters

MONDAY, DECEMBER 9, 2013 LAST UPDATED: MONDAY DECEMBER 9, 2013, 1:17 PM
BY SHAWN BOBURG
STAFF WRITER

THE RECORD
PRINT | E-MAIL

CHRIS PEDOTA/STAFF PHOTOGRAPHER

Cedrick Fulton, Deputy Director at Port Authority for Tunnels, Bridges and Terminals giving testimony during a NJ Assembly Transportation Committee hearing on the closing of lanes at George Washington Bridge.

Related: Port Authority chief's email demands answers to closing of lanes leading to George Washington Bridge

TRENTON - Port Authority officials knew beforehand that reducing Fort Lee's access lanes to the George Washington Bridge would result in major backups on the borough's roads, documents obtained by The Record show.

Engineers predicted that the mysterious lane shift that rattled morning rush-hour commuters in September — and is the subject of an investigative hearing before state lawmakers in Trenton this morning — would cause 600-vehicle-long lines on Fort Lee roads that would not clear until noon each weekday, internal e-mails between agency officials show.

Audio: Assembly committee hearing

Cedric Fulton, the agency's director of tunnels, bridges and terminals, testified that the study was a change from normal protocol. He said planning usually starts with his team and goes up and sometimes a study could be more than a year in the making.

But the correspondence also shows that planning for the traffic shift began a week and a half before they were put in place and involved consultation with the agency's top engineers, who monitored the effect on traffic.

"This was an unusual request," Fulton said Monday. "It wasn't typical at all."

What the internal Port Authority documents do not resolve is whether the exercise was a traffic study motivated by honest intentions, as Christie administration officials maintain, or was something more sinister. The Port Authority's executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, called the traffic pattern change "abusive" and potentially illegal in an internal e-mail previously leaked to the media. That has prompted speculation that the decision was political punishment against Fort Lee's Democratic mayor who did not endorse Christie for re-election. Foye was expected to testify before a panel of the New Jersey Assembly this morning, after he and two other Port Authority officials received subpoenas last week compelling their appearances.

David Wildstein, the Christie appointee who ordered the lane adjustment in September, announced on Friday that he plans to resign at the end of this year because the controversy has become a distraction. Wildstein is the former Republican mayor of Livingston and a political consultant who went to high school with Christie. Christie officials have accepted blame for not communicating about the traffic change but have maintained that they were studying whether reducing Fort Lee access to toll lanes would result in faster commutes for other drivers approaching the bridge.

The Record obtained dozens of e-mails between Port Authority staff, mostly engineers and officials responsible for bridges and tunnels, written before and during the lane closures. The documents appear to have been selected to make the case that the agency did, in fact, conduct a study.

They show that planning began at least a week and a half before the changes were put in place on Sept. 9, without notice to the public or local officials in Fort Lee. Engineers were ordered to put the lane shift in place and made plans to monitor its impact on traffic.

Fulton testified Monday that Wildstein had said that he would take care of notifications to the agency's executive director and Fort Lee officials. But that didn't occur, Fulton said.

But the e-mails do not indicate whether the engineers or other experts within the agency believed it was a good idea. Nor do they shed light on the reason Fort Lee officials and the public were not notified in advance.

For decades, three of 12 eastbound toll booths on the George Washington Bridge have been reserved for traffic coming off a Fort Lee access ramp during morning rush hours. During the study, that number was cut down to one; the two lanes were instead dedicated to regular traffic on I-95 between Sept. 6 through Sept. 9.

Local officials and commuters complained almost immediately.

Robert Durando, the bridge manager, wrote to the agency's principal traffic engineer on Monday afternoon, after the first day with lane modifications went into effect.

"We fielded 10 or so angry customers... and I had an unpleasant interaction with (the Fort Lee) Police Chief and Asst Chief about congesting the Borough, and preventing the smooth flow of emergency response vehicles throughout the Borough. Their characterization was that the 'test' was a monumental failure. Fort Lee is not happy."

Durando, at the hearing Monday, testified that he got a call from Wildstein on Friday to start the study on Monday – and that Wildstein told him not to tell public officials.

"I was instructed not to speak to anyone in Fort Lee," Durando said.

In his 35 year career, Durando said he has never been instructed not to tell a host town about a traffic study. He has been general manager of the bridge for 11 years and was general manager of the Holland Tunnel for 2 years

Durando, who called the request "odd," was asked whether Wildstein gave him a reason not to inform Fort Lee.

"He said it would impact the study," Durando said. " He wanted to see what would naturally happen."

While the study was underway, agency engineers were requesting daily summaries of the effect on traffic and they compiled a report four days into the change.

On Tuesday, the second day, Durando wrote to an engineer: "A little better than yesterday but still not good," adding that, although I-95 approach lanes were clear by 8:30 a.m., Fort Lee's "were packed."

At just after 5 p.m. on Thursday, Daniel Jacobs, a manager in the department that oversees tunnels and bridges e-mailed Mark Muriello, another high-ranking employee within the department, a document entitled, "Reallocation of Toll Lanes at the GWB: An EARLY assemssment of the benefits of the trial."

The report said the lane shift shaved off an average of five minutes for I-95 drivers over the four days. But the combined delays experienced by motorists from the Fort Lee entrance eclipsed the time savings for other drivers. The Fort Lee traffic waited a combined additional 2,800 hours during the four busiest morning commuting hours, while I-95 traffic saved a total of only 966 combined hours over that time. The report referenced the predictions made prior to the test.

"An analysis of traffic prior to the implementation assumed unprocessed demand could reach over 600 vehicles" on local streets, the report said. "Queues were predicted to continue until around noon... This matches actual performance observed by GWB management."

The lane shift not only increased overall delays. It was projected to result in $137,000 less toll revenue each year and cost an additional $600,000 for toll collectors and an unknown amount for extra police, the records show.

On Friday of that week, Foye, the agency's executive director, reversed the decision, calling the move "hasty and ill-advised." He said agency protocol had been "wrongfully subverted" and that state and federal laws may have been broken. He did not identify who he believed subverted protocol, but he said he would conduct an investigation. He, Durando, and Fulton were sent subpeonaes to appear before the panel this morning. Foye said last week that he planned to testify.

The agency's deputy executive director, Bill Baroni, a Christie appointee, testified before the same Assembly transportation committee last week. He said that Wildstein had ordered the study after the president of the Port Authority's police union had expressed concern about traffic delays leading up to the bridge. Paul Nunziato, the union president, confirmed that last week and suggested that Foye was politicizing the traffic study to undermine New Jersey's representatives within the bi-state agency, which doles out money for public works project on both sides of the Hudson River.

Email: boburg@northjersey.com

- See more at:
http://www.northjersey.com/news/transportation/Documents_show_Port_Authority_knew_GWB_lane_closures_would_cause_major_trouble_for_commuters.html?page=all#sthash.AJKtBoSA.dpuf

Rechler, Scott

From:	David Garten < >
Sent:	Monday, December 09, 2013 5:12 PM
To:	Rechler, Scott
Subject:	Wisniewski: Baroni should be gone from Port Authority

Wisniewski: Baroni should be gone from Port Authority

By Bill Mooney | December 9th, 2013 - 4:52pm

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TRENTON – Assembly Democrats said Monday they need more answers regarding the depth of involvement of the Port Authority's top N.J. appointee into the September Fort Lee lane closures.

The Transportation Committee Chairman, John Wisniewski, made it clear: He personally thinks former state Sen. Bill Baroni should be gone. "He's outlived his usefulness at the Port Authority," he said.

Another committee Democrat, Gordon Johnson, was succinct in his assessment of Baroni's appearance two weeks ago: "Baroni was not truthful with us."

After a daylong hearing before the Committee at which the top Port Authority executive blamed N.J.'s No. 2 appointee for the decision to shut Fort Lee lanes at the George Washington Bridge in September, Democrats said it raised questions about how much Baroni knew about the four-day lane closures there.

Wisniewski said the panel might issue a subpoena for both Baroni and since-resigned N.J appointee David Wildstein.

Baroni appeared two weeks ago before the committee on a voluntary basis, but in light of today's testimony from three Port Authority officials, committee members expressed skepticism that Baroni did not know about the closures ahead of time.

Wisniewski said it was his belief, and the belief of other committee members, that Baroni should be gone from the Authority. He said that a major unanswered question is whether Wildstein communicated with Baroni about closing lanes ahead of time.

Johnson said that when Baroni testified Nov. 25, he gave lawmakers the impression that a traffic study was needed into why the majority of bridge users were inconvenienced because three lanes were given over to host town Fort Lee.

"There was no study," Johnson said today after hearing the testimony from Authority Executive Director Patrick Foye, the top N.Y. appointee. "Nobody's talking about a study."

And Wisniewski said after the hearing that it appeared the closures occurred first and then Authority officials concocted the traffic study story later.

The panel even took testimony today from an engineer, Hal Simoff, who said if one was going to study traffic, shutting lanes as the Authority did is not the way to go about it.

Published reports have said the closures might have been political retribution against Fort Lee's mayor.

Foye and two other top Authority officials on Monday pointed the finger at Wildstein, who submitted his resignation last week, citing the "distraction" that the lane closure situation had become.

When asked today why the committee had not subpoenaed Wildstein as it did the other officials who appeared Monday, Wisniewski talked about the methodical approach the committee is taking, and he pointed out that it took all day today to hear from just four witnesses. But he said that he and Baroni still could be subpoenaed.

Foye today reiterated a previously stated opinion that the lane closures possibly violated a federal bridge act as well as the states' laws.

Although he sought to reassure lawmakers several times today that this would not recur, Democrats were skeptical.

"How do we tell our constituents it's all better?" Wisniewski said. "From what they see it's not."

Rechler, Scott

From:	David Garten < >
Sent:	Monday, December 09, 2013 5:21 PM
To:	Rechler, Scott
Subject:	wiz press release

Wisniewski: Baroni & Wildstein Must Go & PANYNJ Dysfunction Frighteningly Rampant

Vows Further Inquiry by Committee

Assembly Deputy Speaker John Wisniewski (D-Middlesex), chairman of the Assembly transportation panel, released the following statement Monday after hearing testimony from Port Authority of New York and New Jersey officials on the questionable closing of George Washington Bridge access lanes from Fort Lee in September:

"Several things are clear after today's hearing.

"Bill Baroni has outlived his usefulness as the Port Authority's deputy director. The testimony showed that Mr. Baroni has not been honest with the public and this committee about these lane closures and his mythical traffic study.

"Mr. Baroni must go. No one can have any confidence in his abilities.

"We also understand an atmosphere of fear apparently envelopes the agency, with career employees afraid to speak up for fear of retribution, even when questionable activity is taking place that puts public safety at risk.

"We also heard first-hand about the rampant dysfunction prevalent throughout this agency, in which staffers feel free to go rogue and purposefully hide their activities from the executive director. We have a staffer implicated in wrongdoing who is sitting around making $150,000 a year with no responsibilities. We see no accountability for high-ranking staffers. We hear of laws possibly being broken with no follow up action taken.

"Mr. Wildstein must also go, and Mr. Foye must do better.

"Indeed, the operations within this agency seem too bizarre to be true, but the testimony indicates otherwise. That's frightening, considering this agency's responsibilities.

"Our work is not complete. I expect more hearings to be scheduled, with more subpoenas certainly possible.

"The dysfunction of this vital agency cannot be allowed to stand, and the public deserves answers on what actually happened here. Otherwise, the public can have no confidence political appointees

won't run amuck again, treating this agency like a local sewer authority with no accountability or consideration given to public safety."

Rechler, Scott

From:	Rechler, Scott
Sent:	Wednesday, October 02, 2013 9:54 AM
To:	David Garten)
Subject:	FW: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

FYI ...

From: Samson, David
Sent: Wednesday, October 02, 2013 9:38 AM
To: Rechler, Scott
Subject: FW: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

these continued leaks will create increased problems for our relations.

Port Chief Fumed Over Bridge Jam

The Wall Street Journal

October 1, 2013

The abrupt closure of local access lanes to the George Washington Bridge last month triggered a pointed private response from the executive director of the Port Authority of New York and New Jersey, who said the move likely broke state and federal laws and could have caused deaths because of snarled traffic.

To view the full text, please click here.

- October 1, 2013, 10:40 p.m. ET

Port Chief Fumed Over Bridge Jam

Patrick Foye Fired Off an Email Message After Learning of Lane Closures

By

- TED MANN
- CONNECT

The abrupt closure of local access lanes to the George Washington Bridge last month triggered a pointed private response from the executive director of the Port Authority of New York and New Jersey, who said the move likely broke state and federal laws and could have caused deaths because of snarled traffic.

The executive director, Patrick Foye, fired off an email message early on the morning of Sept. 13, after he learned of the lane closures and subsequent traffic backups in Fort Lee, N.J., from a daily internal list of pending media inquiries.

Mr. Foye's blistering email, which was sent to top executives of the authority and was reviewed by The Wall Street Journal, denounced the closures as "abusive" and pledged to investigate "how PA process was wrongfully subverted and the public interest damaged to say nothing of the credibility of this agency."

"I pray that no life has been lost or trip of a hospital- or hospice-bound patient delayed," Mr. Foye wrote, a reference to ambulances caught in traffic.

PA - GWB - 005265

The closure of the lanes was seen by some in Fort Lee and Bergen County as retribution from surrogates of Republican Gov. Chris Christie—who shares control of the authority and its bridges with New York Gov. Andrew Cuomo—at Fort Lee Mayor Mark Sokolich, a Democrat who hasn't endorsed Mr. Christie for re-election.

Mr. Christie's campaign has denied the suggestion, and called the notion "crazy." The governor's appointees at the authority have said that the lanes were closed to conduct a traffic study, though they have declined to provide any supporting materials or findings.

Mr. Christie's spokesman referred questions to the Port Authority, where a spokesman declined to comment.

Mr. Foye, an appointee of Mr. Cuomo, wrote that the lane closures were made without informing numerous interested parties, including himself, local and Port Authority police, Mr. Sokolich, and commuters.

His email also throws into question the Port Authority's prior explanation for the shutdown: that the lanes were closed so the authority could perform the traffic study.

In the email, Mr. Foye listed the divisions within the authority that weren't consulted before the traffic pattern was changed, including the police department, and the Traffic and Engineering division.

The authority's public response has described the lane closures as part of "a week of study at the George Washington Bridge of traffic safety patterns."

People familiar with the matter disputed that. "There was no study," one of them said.

Mr. Foye's email was sent to Robert Durando, the general manager of the bridge for more than a decade, and Cedrick Fulton, director of the Tunnels, Bridges and Terminals Department and Mr. Durando's boss. Copied on the message were the highest level leadership of the authority, including Mr. Christie's two top appointees, Chairman David Samson and Deputy Executive Director Bill Baroni.

Mr. Durando referred inquiries to the authority's press office. Requests to speak to top port executives weren't answered Tuesday.

The lane closures winnowed the approach routes from Fort Lee to the bridge to one from three, and triggered massive congestion in Fort Lee for four straight weekdays, officials said. The lanes were reopened within minutes of Mr. Foye's email on Sept. 13.

Some Bergen County Democrats were livid over the sudden closures. Senate Majority Leader Loretta Weinberg, a Democrat who represents the county, wrote to authority Commissioner William Schuber to express her dismay last month, saying she was at a "loss for words" about the closure, according to a copy of the letter reviewed by The Wall Street Journal.

"This whole traffic jam still remains a mystery," she said Tuesday.

Mayor Sokolich said he hasn't received answers to his request for information about why the authority ordered the closures. Still, the mayor said he was a supporter of many of Mr. Christie's policies, and didn't believe that the closures were intended to punish him, a theory he said had been the subject of "rumors."

—Heather Haddon contributed to this article.

Write to Ted Mann at ted.mann@wsj.com

A version of this article appeared October 2, 2013, on page A15 in the U.S. edition of The Wall Street Journal, with the headline: Port Chief Fumed Over Bridge Jam.

Rechler, Scott

From: Rechler, Scott
Sent: Saturday, December 14, 2013 8:07 AM
To: 'David Garten'
Subject: RE: Article that gives brief mention of Lisa's departure - she did a great job of minimizing this

Looks like the Lisa piece was handled well. I feel bad that she was dragged into this.

From: David Garten
Sent: Saturday, December 14, 2013 8:02 AM
To: Rechler, Scott
Subject: Article that gives brief mention of Lisa's departure - she did a great job of minimizing this

Christie ally steps down in wake of George Washington Bridge scandal

Jenna Portnoy/The Star-Ledger By **Jenna Portnoy/The Star-Ledger**

Email the author | Follow on Twitter

on December 14, 2013 at 6:50 AM, updated December 14, 2013 at 6:57 AM

TRENTON — Gov. Chris Christie's top appointee to the Port Authority of New York and New Jersey resigned Friday amid questions over whether he ordered a traffic jam **at the world's busiest bridge** as political payback.

The Republican governor accepted the resignation of Bill Baroni, the agency's deputy executive director, effective immediately, and praised the former state senator's four-year stint at the bi-state agency.

"Bill Baroni is a friend of mine, has been an outstanding public servant both in his time in the Legislature and his time at the Port Authority and I have no reason not to believe him," Christie said at a Statehouse news conference, noting their 20-year relationship dating back to the governor's days as a Morris County freeholder.

Late last month, Baroni testified before a state Assembly committee that three lanes to the George Washington Bridge in Fort Lee were closed Sept. 9 to 13 to conduct a traffic study.

"I've never said that a mistake wasn't made, but what I've said is all of the other politics swirling around it was created, was manufactured," said Christie, who took questions for nearly an hour.

State and national Democrats believe officials loyal to Christie ordered the lane closures to punish the town's Democratic mayor for failing to endorse Christie's re-election bid. The controversy led to two public hearings and the subpoena of documents and correspondence from seven agency officials.

"Mr. Baroni's resignation was overdue and a good thing for New Jersey," said Assembly transportation committee Chairman John Wisniewski (D-Middlesex), whose panel is investigating the issue. "His inability to be clear, professional and honest meant he was no longer going to be effective in his role, if he ever was effective."

The Democratic National Committee on Friday **put out a web video** attacking Christie over the issue and again questioned the governor's judgment after the news conference.

"After an hourlong performance, with a lot of his customary swagger, Christie's not answering and the people of New Jersey still deserve answers," said DNC spokesman Michael Czin, who is from Bergen County.

The governor flat-out denied that he, anyone on his staff or anyone on his campaign had anything to do with the lanes closures. Christie added he doesn't wonder why Baroni did not follow the proper protocols for ordering a traffic study.

"Believe me I've heard more about this than I ever wanted to. If you think my curiosity isn't satiated, my curiosity is more than satiated," Christie said.

Baroni did not respond to a request for comment Friday.

The governor said Baroni approved the traffic study, which has yet to surface, at the request of David Wildstein, the agency's director of interstate capital projects, who has been called Christie's eyes and ears inside the agency.

Wildstein announced his resignation last week, saying he expedited his plans to leave the agency because the bridge issue had become "a distraction."

The Wall Street Journal on Friday reported that Baroni was apparently involved in the effort to keep the lane closures quiet, **citing e-mails the newspaper reviewed.**

When Port Authority Executive Director Patrick Foye told spokeswoman Lisa MacSpadden that he planned to "get word out" about the reopening of the lanes, it prompted a quick response from Baroni, who wrote: "Pat we need to discuss prior to any communications." According to the newspaper, Foye then responded: "Bill we are going to fix this fiasco," to which Baroni said: "I am on way to office to discuss," and "There can be no public discourse."

MacSpadden, director of the Port Authority's office of media relations and an appointee of Gov. Andrew Cuomo, is also leaving the agency. She accepted a job in the private sector last month and said her plan to leave has nothing to do with the bridge flap.

State Sen. Loretta Weinberg (D-Bergen), whose district includes Fort Lee, said the issue isn't settled.

"The resignations of the two highest-ranking New Jersey officials at the Port Authority is clearly an admission of guilt, but it doesn't put an end to this story," she said. "We still don't have a full accounting of what happened, why it was allowed to occur, everyone who was involved and what their motivations were."

Christie denied a Wall Street Journal account that he contacted Cuomo to complain that Foye was too aggressive in his pursuit of the truth. "That story is categorically wrong. I didn't not have that conversation with Gov. Cuomo in any way, shape or form, and he did not have that conversation with me," Christie said.

The governor added that his pick for chairman of the agency's board, David Samson, is not leaving. He will work closely with Deborah Gramiccioni, Christie's replacement for Baroni.

Gramiccioni was already a federal prosecutor when Christie took over as U.S. attorney in 2002. After a stint working for the attorney general under Gov. Jon Corzine, she later became part of Christie's senior staff when he took office.

Rechler, Scott

From: David Garten <
Sent: Tuesday, December 10, 2013 5:56 PM
To: Rechler, Scott
Subject: Port Authority Inspector General Investigating Bridge Closures

December 10, 2013, 5:30 PM ET

Port Authority Inspector General Investigating Bridge Closures

ByTed Mann

The Port Authority of New York and New Jersey's Inspector General formally launched an investigation Tuesday into the closure of several local lanes at the George Washington Bridge in September, which caused major traffic jams. The investigation was confirmed by Michael Nestor, the office's director of investigations.

And New Jersey state lawmakers are weighing their next step into their investigation into the closures, one day after the Port Authority's executive director undercut the agencv's official explanation for the traffic jams.

The options for the lawmakers could include new subpoenas for appointees of New Jersey Gov. Chris Christie, who would once again try to explain what happened, this time under oath.

Monday's sworn testimony from Patrick Foye, the authority's executive director, contradicted voluntary testimony given to the New Jersey Assembly Transportation Committee by another authority official on a key point: whether a traffic study was really the reason lanes were abruptly shifted on the world's busiest bridge.

Bill Baroni, the deputy executive director and a top appointee of Mr. Christie, had doubled down on that explanation in an appearance before the committee last month. Mr. Baroni said then that David Wildstein, his subordinate and another official with close ties to the governor, gave the order to close two of three local access lanes from Fort Lee, N.J., onto the bridge so the authority could make a decision about the fairness of dedicating toll plaza lanes to local traffic.

More In George Washington Bridge

- Officials Testify They Were Told to Break Chain of Command in Bridge Controversy
- Port Authority Official Who Ordered Bridge Closure Resigns
- Port Official Subpoenaed in George Washington Bridge Flap
- Hearings Sought in New York on George Washington Bridge Lane Closures
- Port Official Explains Bridge Lane Closure Before Skeptical Lawmakers

But people familiar with the matter had long cast doubt on that explanation, and on Monday Mr. Foye, the top appointee of Gov. Andrew Cuomo, said it wasn't true.

"I'm not aware of any traffic study," Mr. Foye told the committee. "I don't know why it was done."

Democratic lawmakers have suggested the lane closures were a gesture aimed at Fort Lee, which was beset by traffic due to the lane closures, and where the borough's Democratic mayor had declined to endorse Mr. Christie's reelection. A Christie spokesman has called that notion "crazy."

One day after the hearing, the incident received new national attention. Fresh off an appearance on Rachel Maddow's MSNBC show to discuss the matter, Assemblyman John Wisniewski said he was "not ruling anything out and not ruling anything in." Mr. Wisniewski is chairman of the transportation committee, and a former chairman of the state Democratic Party who has tangled with the Christie administration and the authority.

Mr. Wisniewski said he wants to "take a look at the transcripts from both hearings and figure out where the holes are in the testimony, and what jumps out from those gaps."

One of the biggest causes for concern, Mr. Wisniewski said, is Mr. Baroni's contention that he knew about Mr. Wildstein's plan to close the local lanes "a full week before the executive director did."

"I've got to be honest with you there's something wrong with this story," Mr. Wisniewski said. "That's something that speaks to an institutional problem at the Port Authority."

Mr. Wildstein resigned last week, effective Jan. 1, and Mr. Wisniewski and Democratic colleagues have said Mr. Baroni too should resign.

A spokesman for Mr. Christie didn't respond when asked if the governor was confident in the accuracy of Mr. Baroni's testimony, or whether he believed Mr. Baroni should consider resigning.

Messrs. Baroni, Wildstein, and Foye didn't respond to requests for comment relayed by an authority press officer on Tuesday.

Rechler, Scott

From:	David Garten <
Sent:	Wednesday, December 11, 2013 9:25 AM
To:	Rechler, Scott
Subject:	Ledger editorial

This was posted online 22 min ago and didn't make the clips:

Subpoena Christie's political appointees to answer for GWB lane closures: Editorial

The attempts by Bill Baroni, deputy executive director of the Port Authority of New York and New Jersey, to describe an unknown and unannounced traffic study last month at the Statehouse failed to end doubts about the GWB lane closures. *(Tony Kurdzuk/The Star-Ledger)*

Star-Ledger Editorial Board By **Star-Ledger Editorial Board**

on December 11, 2013 at 9:00 AM

The first time Bill Baroni spoke to lawmakers about the George Washington Bridge brouhaha, it was a laugher. That was just two weeks ago, when Baroni, deputy executive director of the Port Authority of New York and New Jersey, blamed a secret "traffic study" for **traffic jams that crippled Fort Lee in September**.

Now that his cover story is starting to unravel, legislators should subpoena Baroni to testify again — this time under oath, with the threat of perjury hanging over his head.

Baroni wants us to believe the Port Authority was **studying the bridge's traffic patterns** when it blockaded two-thirds of Fort Lee's entry lanes, sparking three days of gridlock starting Sept. 9. The agency, he testified, wanted to measure the effect of the Fort Lee shutdown on other bridge traffic. (Hint: It moves faster.)

New Jersey lawmakers, led by Assemblyman John Wisniewski (D-Middlesex) and Sen. Loretta Weinberg (D-Bergen), aren't buying it. And with good reason: Nobody involved with George Washington Bridge's operations knew anything about Baroni's phantom "study."

That includes Patrick Foye, Baroni's boss and the Port Authority's top executive, who was subpoenaed to Trenton on Monday and testified, under oath, that he wasn't told about the clandestine study, either. When he learned about it from reporters, he demanded the lanes be reopened.

The widely held suspicion is that Baroni and David Wildstein, the PA's director of interstate capital projects, ordered the traffic squeeze to punish Fort Lee's Democratic mayor, Mark Sokolich, for refusing to endorse Gov. Chris Christie's re-election.

It's the possibility of a Christie link — Baroni and Wildstein are Christie appointees — that's fueling speculation. And Baroni's flimsy excuses, coupled with Wildstein's abrupt resignation announcement last week, only add to the believability.

After Monday's hearings, **Wisniewski called for Baroni to resign from the Port Authority or be fired**. That's jumping the gun.

Now that Foye has testified, Baroni and Wildstein should get subpoenas, too. The goal should be to find out what happened on the bridge, with an eye toward any communication with the governor's office. Full disclosure is a top priority.

Time is a factor. The Assembly transportation committee's subpoena power expires when the current legislative session ends on Jan. 13. After that, the Assembly must vote to restore it.

Christie has denied a role in the bridge fiasco, dismissing reporters' questions with jokes and chiding Democrats for investigating. But this is more than political theater. The amateurish shutdown put people at risk. What if firetrucks or ambulances were stuck in the gridlock? Even Foye called the closure "dangerous" and "outrageous."

It's past time for jokes and fairy tales. What's needed, finally, are truthful answers. Let's hope the threat of perjury charges shakes loose some official honesty.

Rechler, Scott

From: David Garten >
Sent: Thursday, December 12, 2013 12:00 PM
To: Rechler, Scott
Subject: Re: Cuomo comments on PA issue

First article:

DECEMBER 12, 2013 11:52 AM

Gov. Cuomo Calls Port Authority Controversy Over GWB Lane Closures a 'New Jersey Issue'

BY KEN LOVETT

Blame New Jersey.

That was basically Gov. Cuomo's response when asked about the ongoing controversy regarding the September lane closures on the George Washington Bridge.

"This is more of a New Jersey issue," Cuomo said to host Susan Arbetter on public radio's "The Capitol Pressroom" this morning.

He noted the New Jersey state Legislature is holding hearings on the issue.

"I don't know anything more than basically what's been in the newspapers, but this is basically a New Jersey issue," Cuomo said.

For four days in September, two of the lanes on the George Washington Bridge were ordered closed, leading to delays of up to four hours that backed up into Fort Lee, NJ.

Port Authority Deputy Executive Director Bill Baroni, an appointee of New Jersey Gov. Chris Christie, has since said the lane closures were done for a traffic study.

But Cuomo-appointed Port Authority Executive Director Pat Foye, who ordered the bridge fully reopened after four days, said he wasn't aware of such a study.

A host of lawmakers have called for Baroni to be fired by Christie.Some have said the lane closures that impacted Fort Lee were ordered by a close associate of Christie in retaliation for the Democratic mayor not endorsing the Republican governor's re-election bid--a notion Christie has dismissed.

- andrew cuomo
- bill baroni
- chris christie
- george washington bridge
- pat foye

On Thu, Dec 12, 2013 at 11:53 AM, David Garten > wrote:
I can't find anything on any news sites, but on twitter some folks are saying that the Governor made some comments on GWB. The first tweet is from a reporter from the NY Times and the other is from City and State:

User Actions
Follow

Thomas Kaplan@thomaskaplan

"This is more of a New Jersey issue," Cuomo says of the G.W. Bridge lane closures. He says he knows only what he has read in the papers.

m. g. johnson @MGJohnson2421m

.@NYGovCuomo took a complete dodge on the Port Authority/Chris Christie scandal question, probably a smart move but the left won't like it.

Rechler, Scott

From: David Garten · >
Sent: Thursday, December 12, 2013 4:12 PM
To: Rechler, Scott
Subject: more subpoenas

Wisniewski Issues 7 More Subpoenas as Part of Investigation into Port Authority's George Washington Bridge Lane Closings

Seeks Documents and Communications from Top PANYNJ Officials

(TRENTON) - Assembly Deputy Speaker John Wisniewski on Thursday announced he has issued seven more subpoenas as part of his continued investigation into the Port Authority of New York and New Jersey's decision to close access lanes from Fort Lee to the George Washington Bridge in September without public notice or explanation.

The subpoenas seek documents and communications from the following key Port Authority officials:

· Patrick Foye; Executive Director
· Bill Baroni; Deputy Executive Director;
· David Wildstein; Director of Interstate Capital Projects;
· Cedrick Fulton, Director of Tunnels, Bridges and Terminals;
· Robert Durando, General Manager of the George Washington Bridge;
· Paul Nunziato, President of the Port Authority Police Benevolent Association; and
· Darcy Licorish, Port Authority Police Department.

"We have heard from four key Port Authority officials, yet we still don't have any clear explanation for why and how these lanes were closed without public notice, putting public safety at risk throughout an entire community of our state," said Wisniewski (D-Middlesex), chairman of the Assembly transportation committee that has held two hearings on the matter. "Mr. Baroni was especially evasive, and subsequent testimony called into question the honesty of his remarks. These documents should provide key insight into whether these lane closings resulted from political operatives who were running amuck, or just sheer incompetence. Either answer is unacceptable, but the public deserves to know the truth."

Baroni claimed the lanes were closed for a traffic study. Fulton and Durando on Monday told the Assembly transportation panel that Wildstein ordered the lanes closed without public notice, but Foye told the committee on Monday that no traffic study existed. The Fort Lee mayor had implied the lanes were closed for political retribution.

Wildstein recently announced his resignation, but will be staying at the Port Authority through Jan. 1 making his $150,000 annual pay without job responsibilities.

Wisniewski has called for Wildstein and Baroni to be removed from the Port Authority by Gov. Chris Christie.

"Serious questions remain as to who plotted to close these lanes, who knew of the plans and what the real goal was here," Wisniewski said. "We know there was no traffic study. We know Mr. Baroni was evasive, unprofessional and seemingly less than truthful. We know Mr. Wildstein tried to keep these lanes closings hushed. We know Mr. Foye was left in the dark. We know Gov. Christie has scoffed at this serious issue. What we don't know is how exactly this happened. These subpoenas for documents are the next step in our investigation and will open the door to more possible subpoenas for testimony."

All seven subpoenas seek by Dec. 19:

· All documents and correspondence, produced between August 1, 2013 and the present date between Governor Chris Christie or any member of his administration and/or any employee, officer, or executive of the Port Authority, concerning the reduction from three to one of the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from September 9, 2013 through September 13, 2013;

· All documents and correspondence, produced between August 1, 2013 and the present date, between and among any employee, officer, or executive of the Port Authority, including any documents and correspondence sent or received by Patrick Foye, Executive Director; Bill Baroni, Deputy Executive Director; David Wildstein, Director of Interstate Capital Projects; Cedrick Fulton, Director of Bridges, Tunnels, and Terminals; Robert Durando, General Manager of the George Washington Bridge; Paul Nunziato, President of the Port Authority Police Benevolent Association; and Darcy Licorish of the Port Authority Police Department concerning the reduction from three to one of the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from September 9, 2013 through September 13, 2013.

The subpoena to Foye also seeks:

· As referenced by Patrick Foye during the Assembly Transportation, Public Works and Independent Authorities Committee meeting on December 9, 2013, a copy of the media pendings from September 9, 2013 through September 13, 2013;

· As referenced by Patrick Foye during the Assembly Transportation, Public Works and Independent Authorities Committee meeting on December 9, 2013, a timeline of events surrounding the reduction from three to one of the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from September 9, 2013 through September 13, 2013, including, but not limited to, the date when it was determined that Darcy Licorish would be promoted, the date of Mr. Licorish's promotion, the dates and times when Mr. Wildstein ordered individuals to close the access lanes, the date and time when Mr. Licorish was notified about the lane closures, and the date and time of any communications between Fort Lee borough police, mayor, or staff and the Port Authority; and

· As referenced by Patrick Foye during the Assembly Transportation, Public Works and Independent Authorities Committee meeting on December 9, 2013, estimates for the average delay to traffic at the Fort Lee entrance to the George Washington Bridge from September 9, 2013 through September 13, 2013 and the travel time impact for every other approach to the bridge from September 9, 2013 through September 13, 2013.

Rechler, Scott

From: David Garten < >
Sent: Wednesday, November 27, 2013 3:34 PM
To: Rechler, Scott
Subject: Pat has been subpoenaed

Wisniewski Subpoenas Port Authority of NY & NJ Executive Director to Explain George Washington Bridge Lane Closures

Orders PANYNJ Chief to Appear at Special Dec. 9 Hearing in Trenton

(TRENTON) - Assembly Deputy Speaker John Wisniewski on Wednesday subpoenaed the Port Authority of New York and New Jersey's executive director to attend a special December hearing on the agency's finances and its decision to close lanes to the George Washington Bridge in Fort Lee.

Wisniewski (D-Middlesex), the Assembly transportation committee chairman, ordered Patrick Foye, the authority's executive director, to appear at a special Dec. 9 hearing in Trenton.

The subpoena comes after the authority's deputy director, Bill Baroni, refused on Monday to directly answer many committee questions on the lane closures and provide data to support his testimony.

"Mr. Baroni's unprofessional testimony created many more unanswered questions," said Wisniewski (D-Middlesex). "It's important for the Legislature to understand the circumstances surrounding these lane closures, as the impact on emergency services from the inexplicable lack of notification could have resulted in the loss of life. It's also now more than two months after the closure and no clear and convincing information has been forthcoming on how this decision was made and why it was suddenly necessary."

Foye is ordered to appear for the 10 a.m., Dec. 9 hearing at the State House and produce documents, correspondence, books, papers and other writings requested by the panel.

"The committee has a responsibility to its constituents to obtain answers to these questions and ensure that protections are in place to guarantee such an event will not happen again," Wisniewski said. "We need to know whether this was incompetence or political mischief by political appointees. A more public and thorough discussion of these issues is necessary, and I look forward to Mr. Foye's input."

Under the subpoena, Foye is compelled to appear to testify and asked to produce:

· All documents and correspondence, produced between Jan. 1, 2013 and the present date between Gov. Chris Christie or any member of his administration and/or any employee, officer, or executive of the Port Authority, concerning the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013;

· All documents and correspondence, produced between Jan. 1, 2013 and the present date, between and among employees, executives, or officers of the Port Authority, including any documents and correspondence sent or received by David Wildstein, Director of Interstate Capital Projects concerning the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access

lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013;
· All documents and correspondence referenced and cited to by Baroni at Monday's Assembly Transportation, Public Works and Independent Authorities Committee meeting, including, but not limited to, any traffic count, traffic report, or traffic study, produced by any employee, executive, or officer of the Port Authority or any third party working on behalf of any employee, executive, or officer of the Port Authority related to the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013;
· All documents and correspondence supporting Mr. Baroni's assertion at the Monday New Jersey Assembly Transportation, Public Works and Independent Authorities Committee meeting that: (a) on Tuesday, Sept. 10, 2013 the General Manager of the George Washington Bridge noted a four minute reduction in travel time for commuters using the I-95 approach to the George Washington Bridge and a three minute reduction in travel time for commuters using local road approaches to the George Washington Bridge; (b) on Wednesday, Sept. 11, 2013 the General Manager of the George Washington Bridge noted a reduction in travel time for commuters using the I-95 approach and the local road approaches to the George Washington Bridge; and (c) 105,000 regular EZ-Pass users cross the George Washington Bridge each morning and 4,839 of those users are from Fort Lee, New Jersey;
· Copies of all rules, regulations, or written policies of the Port Authority concerning the process for closing access lanes to the George Washington Bridge. Copies of all rules, regulations, or written policies of the Port Authority concerning the process for approving and conducting traffic studies, including, but not limited to any rules, regulations, or written policies concerning public and law enforcement notification of lane closures in relation to traffic studies; and
· All information concerning the impact on toll collections or any other economic impact to the Port Authority or the New York, New Jersey Metropolitan Region resulting from the decision to reduce from three to one, the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from Sept. 9, 2013 through Sept. 13, 2013.

Rechler, Scott

From: David Gartei
Sent: Wednesday, November 27, 2013 3:03 PM
To: Rechler, Scott
Subject: Lawmaker asks Port Authority inspector general to probe GWB lane closures

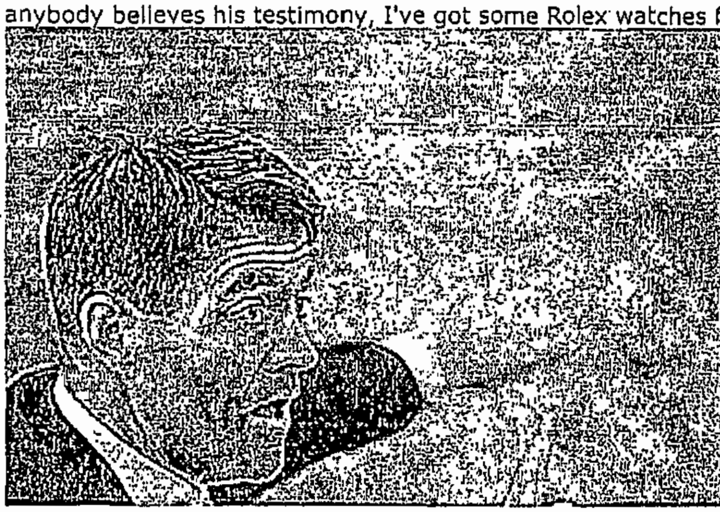
Lawmaker asks Port Authority inspector general to probe GWB lane closures

Steve Strunsky/The Star-Ledger By Steve Strunsky/The Star-Ledger

Email the author | Follow on Twitter

on November 27, 2013 at 2:55 PM

"If anybody believes his testimony, I've got some Rolex watches for sale."



Port Authority Deputy Executive Bill Baroni told an Assembly panel Monday that a decision to close local access lanes to the George Washington Bridge in September was to determine the fairness of the lanes. A skeptical lawmaker called for an investigation by the Port Authority inspector general.Tony Kurdzuk/The Star-Ledger

A veteran Democratic lawmaker wrote Wednesday to the Inspector General of the Port Authority of New York and New Jersey asking him to investigate the unannounced closing of George Washington Bridge local access lanes in September.

"The closure of the traffic lanes, that took place without any warning, caused massive delays in the region and posed potential danger as local police were not notified and given the opportunity to prepare for the new traffic flow and backups it caused," the lawmaker, Sen. Dick Codey (D-Essex), wrote in a Sept. 27 letter to Inspector General Robert Van Etten. "Numerous questions have surfaced surrounding the events leading up to the sudden closure of these lanes ranging from, at worst, political motivations to retaliate against a local mayor, to at best, the desire to undertake a traffic study."

Port Authority officials say the agency is conducting its own "review" of the episode. But the inspector general's office, an investigative arm of the bi-state agency vested with police powers, has not been involved in the matter so far, Michael Nestor, the office's lead investigator, said Wednesday.

"We haven't been asked to look into it," Nestor said, adding that the IG's office has launched investigations in the past based on requests from outside the agency.

In an interview, Codey said the IG's office is best equipped to conduct an independent, thorough investigation of why the closures were ordered and why normal protocols were not followed. Van Etten is a 17-year veteran of the IG's office.

He also elaborated on the letter's reference to political motivations.

Codey, a former interim governor and political foe of Republican Gov. Chris Christie, said he simply did not believe an explanation of the closures provided by a top Christie appointee at the agency.

The appointee, Port Authority Deputy Executive Director Bill Baroni, told the Assembly Transportation, Public Works and Independent Authorities Committee that the closures were ordered to determine the fairness of dedicating three out 12 upper-level toll lanes to local bridge traffic, even though Fort Lee residents make up less than 5 percent of bridge users.

Baroni told the committee that a subordinate of his, the agency's director of interstate capital projects, David Wildstein, ordered the closures to assess their traffic impact after the fairness question was raised by Port Authority Police officers. Baroni said he did not know why no notice of the closures was given to commuters or local officials, a failure he nonetheless condemned as "unacceptable."

But Codey dismissed Baroni's explanation, and insisted the closures were ordered by Wildstein in retaliation for Mayor Mark Sokolich's failure to endorse the governor for re-election.

"If anybody believes his testimony, I've got some Rolex watches for sale," Codey said. "How does Mr. Wildstein have the authority to do what he did? And we all know he's a political operative. It's this attitude, 'If you're not with us, we're gonna punish you."

The Port Authority did not immediately respond to a request for comment this afternoon.

Rechler, Scott

From:	David Garten < >
Sent:	Monday, November 25, 2013 4:33 PM
To:	Rechler, Scott
Subject:	Port Authority traffic jam causes head-on collisions of D's and R's - Weinberg quote in here

Port Authority traffic jam causes head-on collisions of D's and R's

By Bill Mooney | November 25th, 2013 - 4:05pm

TRENTON – Political anger continued to echo along Statehouse corridors today after the hearing this morning into Port Authority lane closures at the George Washington Bridge in September.

Transportation Committee Chairman John Wisniewski, (D-19), Sayreville, a longtime critic of the Authority, blasted Deputy Executive Director Bill Baroni after the former senator's appearance, using words like "ham-handed" to describe the Authority lane closure process, and calling Baroni's appearance and attitude "clownish."

Assemblywoman Linda Stender, (D-22), Scotch Plains, accused the Christie administration appointee of participating in a cover-up.

Though today's hearing was in the Assembly, upper chamber lawmakers made their feelings clear.

This afternoon Sen. Kevin O'Toole, (R-40), Wayne fired back. .

"Today's hearing is an example of the type of government waste that happens when out-of-touch Democrats try to score political points against an ever-popular governor," O'Toole said. "What could possibly be the reason to hold a hearing specifically for Fort Lee commuters, to the determent of commuters from elsewhere?"

That gets to the heart of the matter: The committee Democrats this morning wanted to dig deep for details about who knew what when. They wanted Baroni to supply names and emails about how the decision to shutter Fort Lee lanes was reached.

Baroni kept attempting to steer the conversation today back to the overarching concept of the Authority finding out why a few thousand Fort Lee commuters are allowed to inconvenience the other 95 percent of the bridge users.

As a host municipality for the world's busiest bridge, there are three lanes dedicated to Fort Lee commuters.

The lane closures necessitated by a traffic study in September dealt with an issue that has been postponed for too long, Baroni would say, only to have Wisniewski pull the questioning back to chain of command accountability.

"Five legislative districts in this state have more commuters who use the bridge than Fort Lee, including nearly 6,400 from my District 40; 6,767 from District 36; 21,670 from District 37, which includes Fort Lee; 8,226 from District 38; and 8,316 from District 39," O'Toole said in a release. "Are these New Jerseyans not as important as Fort Lee residents?"

"If, we in the Legislature are interested in conducting a fair investigation about commuting, it must start by addressing the concerns of the 95 percent of commuters," O'Toole said. "For example, why was a sweetheart deal done that gave Fort Lee three lanes and a dedicated exit? Who thought this was fair? If we are going to be honest with the citizens of New Jersey then let's be honest, this certainly isn't it."

But Senate Democratic Majority Leader Loretta Weinberg sounded off as well.

"After two and one-half months of stonewalling this is the best story they could come up with," said the senator who also accused the Authority of a cover-up following a meeting two weeks ago.

"Their so-called explanation was sketchy and evasive, reminding me of the proverbial excuse 'the dog ate my homework.' They failed to give an adequate accounting and they failed to answer the key questions.

"If the original intention was really a traffic study I expect to get the documentation, as part of my Freedom of Information request to back up that claim, including the authorization and the role of Port Authority officials in the chain of command."

At the hearing, committee Republicans came to Baroni's defense.

Brian Rumpf, (R-9), Forked River, said Baroni essentially apologized on behalf of the Authority and pledged greater openness in the future.

John Amodeo, (R-2), Northfield, jumped on the topic of fairness that his Democratic colleagues on the committee talked about.

"One big lesson I learned today," Amodeo said, "is that an hour and 25 minutes later you hear from the other side," referring to the amount of time given to Democrats' questions before a Republican was allowed to weigh in.

To Baroni, he said: "You were put there to do the job for the people of the state of New Jersey and I thank you."

But Assemblywoman Marlene Caride, (D-36), Ridgefield, criticized Baroni's mea culpa this morning as too little too late.

"For you to sit there and say there was poor planning ... did you take into consideration how people were going to get onto the George Washington Bridge?"

However, it was another Republican committee member, David Wolfe, (R-10), Brick, who put in perspective the long-term problems of driving in northern New Jersey.

There was the time he intended to attend a Yankees game that had a 1 p.m. start time.

"I left at a quarter to 10. I got to the game at 2:30," Wolfe said.

And he told Baroni that the way he responded today "still leaves questions."

Rechler, Scott

From:	David Garten
Sent:	Monday, November 25, 2013 1:32 PM
To:	Rechler, Scott
Subject:	Re: two posts from NJ political blog

Wisniewski: 'veil of secrecy' still hangs over why Port Authority shut Fort Lee lanes

By Bill Mooney | November 25th, 2013 - 12:40pm

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TRENTON – It was like watching two people wrestle for control of the wheel.

Assembly Democrats wanted Port Authority Deputy Executive Director Bill Baroni to answer questions today about the specific timetable that led up to a traffic nightmare in Fort Lee in September when George Washington Bridge lanes were closed.

Baroni sought to talk about the overall issue of bridge traffic congestion.

The Democrats wanted chain of command specifics: Who knew what when? Who called who when?

Baroni wanted to tell Transportation Committee members about how many of their constituents use the world's busiest bridge every day and whether it is fair to devote three lanes to host community Fort Lee.

In the end, Baroni said he answered fairly the questions put to him while Democrats begged to differ.

Chair John Wisniewski characterized Baroni's answers and Port Authority actions during a break in the committee hearing.

"At best it was clumsy, ham-handed," he said, "at worst, it was political mischief by an appointee they didn't make available" to testify today.

Baroni had said that Port Authority official David Wildstein made the call – after meeting with Port Authority police and engineering staff – that a traffic study necessitating lane closures was needed in early September.

Of the four Authority officials asked to appear today, only Baroni attended.

Wisniewski said they would reach out again to Executive Director Patrick Foye to see if he would be available another day, who begged off, citing a scheduling conflict. Baroni, however, told Wisniewski in no uncertain terms that Wildstein would not appear before the committee.

The panel does have subpoena power if it wants to exercise it but Wisniewski said they don't want to use that power just yet.

Baroni, after exiting the hearing, said that both sides of the aisle today made it clear there are "significant" policy issues that need to be addressed regarding devoting so many lanes to one town at the expense of the 95 percent of the other commuters.

"I think there is a fundamental question of fairness," Baroni said, while reiterating that the Authority needed to do a better job of keeping local officials in the loop in the future.

But Wisniewski was not impressed with Baroni.

He said there "still is a veil of secrecy" over this traffic study at the Authority, and he said it would not have been productive to ask Baroni about whether the shutdowns were a political act because no one would really expect Baroni to admit something like that.

Published reports have suggested the closures were retaliation for the Fort Lee mayor not endorsing the governor's re-election.

"His appearance and attitude were somewhat clownish," Wisniewski said of Baroni's testimony. "He smirked" throughout, he said, and called the Authority's overall attitude about what happened in Fort Lee "cavalier."

Baroni has been at the Authority three and a half years, yet only in the midst of a gubernatorial campaign did the lanes have to be closed, Wisniewski said. "Suddenly, he (Baroni) is shocked three lanes are dedicated to Fort Lee," Wisniewski said.

Read more at http://www.politickernj.com/69841/wisniewski-veil-secrecy-still-hangs-over-why-port-authority-shut-fort-lee-lanes#ixzz2lgLy0niT
or sign up for a free trial of State Street Wire at http://www.politickernj.com/freetrial

On Mon, Nov 25, 2013 at 12:39 PM, David Garten > wrote:

Stender to Baroni: You are good at obfuscating the issue

By Bill Mooney | November 25th, 2013 - 11:32am

TRENTON – Democratic Transportation Committee members piled on the Port Authority today over the Fort Lee lane closures and their traffic problems.

It became a battle to control the discussion: Traffic issues vs. Authority mistakes.

After Chair Assemblyman John Wisniewski finished his sometimes testy conversation with Deputy Executive Director Bill Baroni, Vice Chair Assemblywoman Linda Stender told Baroni that "You do a good job for the Port Authority. You are very practiced at obfuscating the issue."

When Baroni sought to steer the conversation back to the traffic issue of George Washington Bridge congestion, Stender cut him off much like some angered motorist stuck in bridge traffic seeing an opening.

"The Port Authority failed miserably in dealing with Fort Lee," she said to Baroni. "It should have been a routine effort in communications.

"You are here trying to cover that up," Stender said, and added she was shocked that "There is no paper trail, not a single email that explains how this was done."

And Wisniewski jumped back in, telling Baroni he was adept at dodging questions.

Baroni, through it all, kept calm, trying to redirect the testimony back to the commuter issues that plague the committee members' constituents.

And Assemblyman Upendra Chivukula brought his sense of scientific, procedural calm to bear, saying that while he was not condoning the Authority's lack of openness in closing Fort Lee lanes during rush hour, he said Baroni's remarks about policy are to the point, because something has to be done about hundreds of thousands of drivers stuck in traffic every day.

"At its core," the question is whether people from New Jersey should have to sit in such traffic, Baroni said. "Nobody asked, and we should've."

Assemblywoman Celeste Riley pressed that one of the policy changes the Authority should consider is that of apparently allowing one official to make such a far-reaching decision as the Fort Lee lane closures.

Baroni vs. Wisniewski over lane closure accountability

By Bill Mooney | November 25th, 2013 - 11:06am

TRENTON – Lawmakers and Port Authority officials dived into the weeds of the daily traffic snarls of the George Washington Bridge today after Deputy Executive Director and former Sen. Bill Baroni pledged better openness regarding future lane closures.

The Assembly Transportation Committee questioned Baroni about the reasons for the early September lane closures that affected the Fort Lee commuters, who make up less than 5 percent of the daily traffic on the world's busiest bridge.

Baroni used photos and posterboard displays to convince the lawmakers of the traffic-based necessity for studying traffic patterns.

The Authority reduced the Fort Lee-dedicated rush hour lanes from three to one for a study, a study whose motivations some lawmakers have previously questioned as possibly political in nature.

Because of the special lanes for Fort Lee, there are motorists everywhere else stuck in traffic, Baroni told the lawmakers. "How can you not ask the question how is it fair for 95 percent of commuters everywhere else?" Baroni said.

"You can't make this analogy for any other bridge in New Jersey," Baroni said.

There are roughly 4,800 drivers, less than 5 percent, of the commuters who call Fort Lee home, he said.

According to Baroni, 102 million vehicles crossed the George Washington Bridge in 2012, "a vital lifeline for commuters, visitors and regional commerce."

"Drivers from more than 200 municipalities in New Jersey endure delays nearly every day, and that wastes time for drivers, it exacerbates air pollution, and it undercuts the economic competitiveness of the region."

But Chair John Wisniewski pressed for answers regarding the lack of openness and the way Fort Lee was treated in this situation, receiving no advance notice.

"This communication didn't work, Mr. Chairman, you're absolutely right," Baroni said.

But Wisniewski pressed for who made the phone call to put the traffic cones out and close the lanes.

Baroni reiterated his opening statement that David Wildstein of the Authority made the decision to conduct a one-week study.

"What are the steps" Wisniewski said, between a decision being made in an office and others implementing the incremental stages.

Baroni kept returning to his general mea culpa that this should have been handled better.

Wisniewski said to Baroni that "you've made it abundantly clear" that there is a policy question to examine the lane situation. But he said the Authority showing up today and pledging to do better is a little late.

Unless lawmakers know all of the individual steps taken at the Authority, this can happen again, Wisniewski said.

Wisniewski pressed on why the study was conducted when it was.

Rechler, Scott

From:	David Garten
Sent:	Wednesday, December 18, 2013 10:10 AM
To:	Rechler, Scott
Subject:	Star Ledger Editorial - Cuomo's misfire on bridge-gate: Editorial

Cuomo's misfire on bridge-gate: Editorial

Star-Ledger Editorial Board By **Star-Ledger Editorial Board**

on December 18, 2013 at 9:00 AM, updated December 18, 2013 at 9:03 AM

New York Gov. Andrew Cuomo is in some ways the polar opposite of Gov. Chris Christie. He never leaves New York. He rarely appears on national TV. And he raised taxes on the rich to reduce the burden on the middle class. Imagine that.

But these two are pals who talk all the time. It may not qualify as a bromance, but it is civil behavior across a partisan divide that has devoured other political partnerships. So it's not surprising that Cuomo threw a lifeline to Christie over the simmering Bridge-gate scandal.

"I'm sure it is as Gov. Christie says it is," **he told the Daily News on Monday.**

Cuomo might want take a second look, starting with a phone call to Patrick Foye, the man he appointed as executive director of the Port Authority of New York and New Jersey, which operates the George Washington Bridge. Foye can explain to him why Christie's account of this is simply not credible.

The official story line is that Christie's lieutenants at the Port Authority, David Wildstein and Bill Baroni, launched this plan as part of a traffic study. What would happen, they wondered, if two of Fort Lee's three access lanes to the bridge were cut off?

That Monday, Sept. 9, we saw the predictable result: a traffic jam from hell that left motorists stuck for up to four hours in Fort Lee. But Wildstein and Baroni were still curious, so they kept the lane restrictions in place on Tuesday, with the same result. And Wednesday, Thursday and Friday.

Ask yourself this: If you whack yourself over the head with a hammer to find out if it hurts, do you really need to whack yourself again every morning for a week to confirm it?

Foye found out about this that Friday and his head exploded. He ordered the lanes reopened, and **fired off an angry e-mail to Baroni and Wildstein telling them that their little caper was dangerous, probably illegal, and that it would damage the reputation of the Port Authority.**

Traffic study? Foye testified that he had never seen one. Traffic experts testified that professionals don't close lanes to study hypothetical impacts like this; they plug traffic data into a computer model that can project the outcome.

And why did Baroni and Wildstein order employees to keep this secret? Why did they keep Foye out of the loop? And when Foye exploded, why did Baroni double down on his efforts to secrecy by firing off an e-mail telling Foye, **"There can be no public discourse."**

These guys knew they were up to no good. There is no other reason they would have tried to hide it.

So does this mean Democrats are right when they claim the motive was to punish the Fort Lee mayor for refusing to endorse Christie for re-election? No, it does not. So far, there is zero evidence to prove that darker motive. The investigation continues.

But we can reasonably conclude that the story Christie's team is pushing is bogus. Cuomo needs to do some more homework on this one.

Rechler, Scott

From:	Rechler, Scott
Sent:	Friday, December 06, 2013 4:37 PM
To:	'Samson, David'
Subject:	RE: NEWS ALERT: The Record: More Port Authority officials ordered to testify on GWB lane closures

I did not know this. Are you sure about Foye? I don't think he would go near that before having to testify.

-----Original Message-----
From: Samson, David
Sent: Friday, December 06, 2013 4:13 PM
To: Rechler, Scott
Subject: Fwd: NEWS ALERT: The Record: More Port Authority officials ordered to testify on GWB lane closures

Foye arranged for this: did you know?

Sent from my iPhone

Begin forwarded message:

From: Sarah Dolan
Date: December 6, 2013, 3:55:56 PM EST
To: Sarah Dolan
Subject: NEWS ALERT: The Record: More Port Authority officials ordered to testify on GWB lane closures

More Port Authority officials ordered to testify on GWB lane closures Shawn Boburg The Record<http://www.northjersey.com/news/More_Port_Authority_officials_ordered_to_testify_on_GWB_lane_closures.html>

Two more Port Authority officials have been ordered to testify before New Jersey lawmakers on Monday about the unannounced lane closures at the George Washington Bridge in September.

The legislative panel sent subpoenas to Cedric Fulton, the Port Authority's director of tunnels, bridges and terminals, and Robert Durando, the manager of the Fort Lee bridge, ordering them to appear before a committee investigating whether the lane closures were politically motivated to punish Fort Lee's mayor.

A spokesman for Democratic Assemblyman John Wisniewski, chariman of the transporation committee, confirmed on Friday afternoon that both officials were summoned to Trenton to tesify Monday. It's not clear if the officials intend to comply; a Port Authority spokesman did not immediately respond to a request for comment.

The hearing threatens to expose divisions within the bi-state agency between governors on both sides of the Hudson. The lane closures, which caused heavy traffic delays in Fort Lee, were ordered by a Christie appointee without notification to the public, local officials, or the agency's executive director.

The executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, has said he intends to testify after he received a subpoena last week.

Foye called the closures "abusive" and said they were potentially illegal in an internal e-mail that was leaked to the media. Earlier this week, while saying he intended to testify, he said he stands by the e-mail. The Fort Lee Mayor, Mark Sokolich, intially said he believed the closures were "punitive" but has since backed away from that statement. Sokolich, a Democrat, was asked to endorse Christie for re-election in September but declined.

Christie has called the notion that it was political retribution "crazy." His top appointee at the agency, Bill Baroni, testified before the same panel last week and said the lane closures were part of a simple traffic study to determine whether too many toll lanes are dedicated to traffic from a local access ramp. Closing two of the three lanes dedicated to traffic from the local ramp reduced wait times for other traffic, he said. But an internal e-mail written by Foye has led to speculation that the lane closures were something more sinister. Foye said he was not notified about the lane closures in advance; and he reversed them after finding out about them.

Former Port Authority officials interviewed have also said that such decisions on a major facility are typically preceded by several meetings with police, traffic engineers and other agency officials. In this case, Baroni testified, the idea came from the president of the Port Authority police union. It was then ordered by David Wildstein, a former political consultant who went to high school with Christie. Wildstein has the title of director of Interstate Capital Projects but wields enormous power and has been described as the Christie administration's eyes and ears within the agency.

Rechler, Scott

From: Samson, David
Sent: Friday, December 06, 2013 4:46 PM
To: Rechler, Scott
Subject: Re: NEWS ALERT: The Record: More Port Authority officials ordered to testify on GWB lane closures

I know it--more proof: he's dangerous, for all.

Sent from my iPhone

On Dec 6, 2013, at 4:37 PM, "Rechler, Scott" wrote:

> I did not know this. Are you sure about Foye? I don't think he would go near that before having to testify.
>
> -----Original Message-----
> From: Samson, David
> Sent: Friday, December 06, 2013 4:13 PM
> To: Rechler, Scott
> Subject: Fwd: NEWS ALERT: The Record: More Port Authority officials ordered to testify on GWB lane closures
>
> Foye arranged for this: did you know?
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> Sent from my iPhone
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> Begin forwarded message:
>
> From: Sarah Dolan
> Date: December 6, 2013, 3:55:56 PM EST
> To: Sarah Dolan
> Subject: NEWS ALERT: The Record: More Port Authority officials ordered to testify on GWB lane closures
>
> More Port Authority officials ordered to testify on GWB lane closures Shawn Boburg The Record<http://www.northjersey.com/news/More_Port_Authority_officials_ordered_to_testify_on_GWB_lane_closures.html>
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>

>

Rechler, Scott

From:	Garten, David P. ·
Sent:	Sunday, December 15, 2013 12:08 AM
To:	Rechler, Scott
Subject:	Website article is up

Exec behind GWB closure bought Web addresses named for PA chief, Barbara Buono

SATURDAY, DECEMBER 14, 2013 LAST UPDATED: SATURDAY DECEMBER 14, 2013, 11:16 PM
BY ABBOTT KOLOFF
STAFF WRITER

THE RECORD
PRINT | E-MAIL

Related: Port Authority official at center of lane-closure controversy quits

KEVIN R. WEXLER/STAFF PHOTOGRAPHER

David Wildstein, who recently resigned from his job with the Port Authority, has purchased Internet domains named for former gubernatorial candidate Barbara Buono and her running mate, Milly Silva; Port Authority Executive Director Pat Foye; and a misspelling of the law firm of Port Authority Chairman David Samson, among several others.

The Port Authority official who ordered the mysterious lane closures at the George Washington Bridge and sparked a political firestorm for Governor Christie has also quietly purchased Internet domain addresses that use the name of the agency's top executive and Barbara Buono, Christie's Democratic adversary in his recent reelection campaign.

The official, David Wildstein, a Christie appointee who left the Port Authority on Friday after resigning amid the growing controversy, purchased patfoye.com, the name of Pat Foye, the agency's executive director who criticized the closures. And he also purchased domain names that could have been used by Buono and Milly Silva, her running mate, in the race against Christie, including buonosilva.org and millysilva.com.

It is not clear why Wildstein, a childhood friend of Christie's, has been collecting domain names. In some cases, the Web addresses he's purchased have been in the names of presumed adversaries, like Foye. But he also reserved Internet addresses for people he admires, such as the late U.S. Rep. Bob Franks, and a friend's newborn baby.

The domain names often have a common thread, revealing hints of humor and secrecy in a man who once anonymously ran PolitickerNJ under the pseudonym of Wally Edge, the name of a former Republican governor.

None of the names are redirected to sinister websites. In fact, most take users to the website of Wildstein's favorite baseball team, the Yankees.

Still, many targets had no idea that Wildstein reserved their Internet identities and some were stunned when they learned of purchases last week.

Foye "absolutely did not know," that Wildstein in April had purchased patfoye.com, a Port Authority spokeswoman, Lisa MacSpadden, said on Friday. "He's very disturbed and bewildered by that revelation."

Wildstein purchased buonosilva.org on July 26 — the day it was made public that Buono would announce Milly Silva as her running mate. The same day, Wildstein purchased millysilva.com, according to a database of Internet domain names.

"It's amusing, but also creepy and strange," Silva said last week. "The notion that this person purchased domain names I might seek to use is troubling."

Wildstein declined to be interviewed for this article or to explain why he has compiled an inventory of domain names over the years. Internet records show he has purchased at least 48 and has renewed some of them annually. Domain names typically cost less than $10 for a year's exclusive use of the domain name.

Christie's ally

Christie's top political strategist, Mike DuHaime, said neither he nor the governor knew that Wildstein had been purchasing the opposition's domain names.

"This was done independently of the campaign and without any authorization," he said. "The governor had no knowledge either."

Wildstein, who prefers to work in the background, has come under intense scrutiny as controversy has mushroomed over his decision to close two of three access lanes from Fort Lee to the George Washington Bridge in September.

Agency executives testifying before an Assembly transportation committee have said they followed his orders to close the lanes because they feared for their jobs. Wildstein, they said in testimony, ordered the closures to conduct a hastily planned traffic study without telling local authorities. He had been warned the closures would create massive traffic jams, according to testimony.

Foye, who testified that he wasn't told about the study, immediately ordered the lanes reopened when he heard about it from a Road Warrior column in The Record and said in an internal email that the closures may have been illegal.

The Democratic mayor of Fort Lee, Mark Sokolich, wrote a letter to the Port Authority at the time saying the closures were causing problems for emergency vehicles and that he believed they were punitive. He has since backed off that statement.

A profile in The Record last year portrayed Wildstein, who lives in Montville, as wielding enormous power in the Port Authority as he carried out a political agenda for Governor Christie, his high school friend from Livingston.

Wildstein purchased a domain name related to the reporter, Shawn Boburg, who wrote that article and another one about Christie's patronage hires at the agency. The domain linked to a competitor's news website.

The profile depicted Wildstein as a political junkie who won a seat on the local school board when he was 16, even though he was too young to take office. That political obsession comes across in some of the domain names he has purchased. Wildstein has been the owner of haroldstassen.com since October.

Harold Stassen, a former Minnesota governor, was known as a progressive Republican who helped draft the United Nations charter. He is more widely remembered for his nine unsuccessful attempts to become his party's presidential nominee.

Wildstein, as a teenager, worked on Stassen's presidential campaign in 1980, when Stassen no longer was considered a serious candidate.

"Wow, very interesting," Harold Stassen's son, Glen, said last week when he was told his father's domain name was purchased and linked to the Yankees. "My father didn't root for professional baseball teams."

Glen Stassen, who lives in Pasadena, Calif., noted that had his father been a baseball fan, his preference would have been the Minnesota Twins. He said he does not remember Wildstein, but has no problem with the purchase of the domain name.

"I have bigger concerns in life than that, but it's kind of strange," he said.

Cyber squatting?

There have been cases reported across the nation of people purchasing domain names of politicians or celebrities to block them from using them, a practice known as cyber squatting. The victims have included California gubernatorial candidate Meg Whitman and TV host Keith Olbermann.

But Wildstein's motives are not readily apparent. He recently purchased the rights to wolfsamson.com, an incorrectly spelled domain name that apparently refers to Wolff Samson, the law firm of Port Authority Chairman David Samson, a Christie appointee.

In 2012, Wildstein purchased the domain name of a friend's newborn baby. The friend, Democratic consultant and Fox News contributor Julie Roginsky, said it was a "sweet gesture" that she had forgotten about until reminded last week.

"He bought that for me as a gift," she said. "He's a good friend of mine. He's one of the most decent, best people I know."

Wildstein apparently had a different motive on April 13 when he purchased patfoye.com and domain names related to two other Port Authority executives and an administrator with the Federal Aviation Administration.

The move hints at tensions in the bi-state agency between executives from New York and New Jersey, and came five days after the Port Authority and the FAA came to a settlement over the way fires are fought at the region's major airports.

The Port Authority on April 8 agreed to pay a $3.5 million fine to the FAA for failing to demonstrate that agency police officers assigned to fight fires were adequately trained. It also said it would stop using police officers to fight fires and create a separate firefighting unit.

The union that represents the officers, the Port Authority Police Benevolent Association, has protested the agreement, saying it would cost jobs.

Wildstein, an avid supporter of the police union, quickly purchased Foye's domain name and those of Port Authority Vice Chairman Scott Rechler and his adviser, David Garten. Foye and Rechler were appointed to the Port Authority by New York Gov. Andrew Cuomo. None of the three men knew his domain name had been purchased.

On the same day, Wildstein purchased a domain name for Christa Fornarotto, the FAA's associate administrator of airports, who was involved in the settlement. Fornarotto did not respond to messages left at her office last week.

Bob Sommer, a Democratic strategist, appeared to be taken aback when told his domain name belongs to Wildstein, a former colleague at PolitickerNJ. He declined to speculate about why Wildstein made the purchase.

"Wow," he said. "I am shocked that someone who I worked with very closely has taken my domain name without my knowledge."

Email: koloff@northjersey.com

- See more at: http://www.northjersey.com/news/PA_domains.html?page=all#sthash.JREVkQib.dpuf

Rechler, Scott

From: Rechler, Scott
Sent: Thursday, November 07, 2013 7:50 AM
To: David Garten (dgarten@panynj.gov); 'MacSpadden, Lisa'
Subject: FW: Wall Street Journal story/GWB

Did this story come out? I didn't see it.

From: Coleman, Steve [mailto:scoleman@panynj.gov]
Sent: Wednesday, November 06, 2013 10:55 AM
To: Samson, David; Rechler, Scott; Foye, Patrick; Baroni, Bill
Cc: Wildstein, David; Ma, John; MacSpadden, Lisa; Danielides, Philippe; Garten, David
Subject: Wall Street Journal story/GWB

All:

We were contacted this morning by Ted Mann of the Wall Street Journal, who informed us that he is writing another story about the September closing of the GWB local access lanes. The story will be published tomorrow. Ted told us that the story will lead with a description of David Wildstein's order to Bob Durando and Cedrick Fulton to close the local access lanes on the bridge in early September and also will note that David visited the bridge that Monday morning – the first day of the closings -- to make sure the order was carried out and to observe the traffic conditions. The story will further refute any notion that this was part of a traffic study. Ted is looking to give several people in the Port Authority leadership an opportunity to comment, including the chair, vice chair, Pat, Bill, David, Bob Durando and Cedrick. Ted also mentioned that he may try to reach these individuals through other means. We will not respond to this inquiry unless directed to do so.

Rechler, Scott

From:	Samson, David
Sent:	Wednesday, October 02, 2013 12:18 PM
To:	Rechler, Scott
Subject:	Fwd:
Attachments:	image001.jpg

This is now extremely troubling.

Sent from my iPhone

Begin forwarded message:

WSJ sources: GBW lanes closed for political retaliation By PolitickerNJ Staff<http://www.politickernj.com/author/Politicker%20Staff> | October 2nd, 2013 - 10:27am Share on facebook<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on twitter<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on favorites<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> Share on print<http://www.politickernj.com/back_room/wsj-sources-gbw-lanes-closed-political-retaliation> | More Sharing ServicesMore<http://addthis.com/bookmark.php?v=250&username=xa-4b397e5b5422fea1>

The Wall Street Journal is reporting<http://online.wsj.com/article/SB10001424052702304373104579109860563887326?mg=reno64-wsj.html?dsk=y> last month's closure of lanes on the George Washington Bridge is being seen by some in Bergen County as political retribution by New Jersey's Republican governor.

The report suggests Fort Lee's Democratic mayor was retaliated against for not having endorsed Gov. Chris Christie's re-election bid.

Local access lanes to the GWB were closed last month for multiple days for the Port Authority – which is jointly controlled by Christie and New York Gov. Andrew Cuomo – to perform a traffic study. However, people familiar with the dispute told the Wall Street Journal no study was conducted.

The lane closures triggered "massive congestion in Fort Lee for four straight weekdays" and ended abruptly after the authority's executive director fumed about the closure in an email and said the move likely broke state and federal laws, according to the report.

Christie's campaign labeled the suggestion the closure was retaliation as "crazy."

you have received this message in error, please notify the sender immediately by replying to this message and then delete it from your system.
Thank you.
****
IRS CIRCULAR 230 DISCLOSURE: To ensure compliance with requirements imposed by the IRS, we inform you that any U.S. federal tax advice contained in this document (including any attachments) is not intended or written to be used, and cannot be used by the recipient and any other taxpayer, for the purpose of (i) avoiding penalties under the Internal Revenue Code or (ii) promoting, marketing or recommending to another party any transaction or matter addressed herein.
****

Rechler, Scott

From:	Rechler, Scott
Sent:	Wednesday, October 02, 2013 9:57 AM
To:	'Samson, David'
Cc:	Kenny, Dawn
Subject:	RE: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

That would be great. Thanks.

From: Samson, David [
Sent: Wednesday, October 02, 2013 9:55 AM
To: Rechler, Scott
Subject: RE: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

yes--I can call you early afternoon.

From: Rechler, Scott [
Sent: Wednesday, October 02, 2013 9:53 AM
To: Samson, David
Subject: RE: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

Not good but don't think it came from us. You around today to catch up on a few unrelated items?

From: Samson, David
Sent: Wednesday, October 02, 2013 9:38 AM
To: Rechler, Scott
Subject: FW: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

these continued leaks will create increased problems for our relations.

Port Chief Fumed Over Bridge Jam
The Wall Street Journal
October 1, 2013
The abrupt closure of local access lanes to the George Washington Bridge last month triggered a pointed private response from the executive director of the Port Authority of New York and New Jersey, who said the move likely broke state and federal laws and could have caused deaths because of snarled traffic.
To view the full text, please click here.

- October 1, 2013, 10:40 p.m. ET

Port Chief Fumed Over Bridge Jam

Patrick Foye Fired Off an Email Message After Learning of Lane Closures

By

- TED MANN
- CONNECT

The abrupt closure of local access lanes to the George Washington Bridge last month triggered a pointed private response from the executive director of the Port Authority of New York and New Jersey, who said the move likely broke state and federal laws and could have caused deaths because of snarled traffic.

The executive director, Patrick Foye, fired off an email message early on the morning of Sept. 13, after he learned of the lane closures and subsequent traffic backups in Fort Lee, N.J., from a daily internal list of pending media inquiries.

Mr. Foye's blistering email, which was sent to top executives of the authority and was reviewed by The Wall Street Journal, denounced the closures as "abusive" and pledged to investigate "how PA process was wrongfully subverted and the public interest damaged to say nothing of the credibility of this agency."

"I pray that no life has been lost or trip of a hospital- or hospice-bound patient delayed," Mr. Foye wrote, a reference to ambulances caught in traffic.

The closure of the lanes was seen by some in Fort Lee and Bergen County as retribution from surrogates of Republican Gov. Chris Christie—who shares control of the authority and its bridges with New York Gov. Andrew Cuomo—at Fort Lee Mayor Mark Sokolich, a Democrat who hasn't endorsed Mr. Christie for re-election.

Mr. Christie's campaign has denied the suggestion, and called the notion "crazy." The governor's appointees at the authority have said that the lanes were closed to conduct a traffic study, though they have declined to provide any supporting materials or findings.

Mr. Christie's spokesman referred questions to the Port Authority, where a spokesman declined to comment.

Mr. Foye, an appointee of Mr. Cuomo, wrote that the lane closures were made without informing numerous interested parties, including himself, local and Port Authority police, Mr. Sokolich, and commuters.

His email also throws into question the Port Authority's prior explanation for the shutdown: that the lanes were closed so the authority could perform the traffic study.

In the email, Mr. Foye listed the divisions within the authority that weren't consulted before the traffic pattern was changed, including the police department, and the Traffic and Engineering division.

The authority's public response has described the lane closures as part of "a week of study at the George Washington Bridge of traffic safety patterns."

People familiar with the matter disputed that. "There was no study," one of them said.

Mr. Foye's email was sent to Robert Durando, the general manager of the bridge for more than a decade, and Cedrick Fulton, director of the Tunnels, Bridges and Terminals Department and Mr. Durando's boss. Copied on the message were the highest level leadership of the authority, including Mr. Christie's two top appointees, Chairman David Samson and Deputy Executive Director Bill Baroni.

Mr. Durando referred inquiries to the authority's press office. Requests to speak to top port executives weren't answered Tuesday.

The lane closures winnowed the approach routes from Fort Lee to the bridge to one from three, and triggered massive congestion in Fort Lee for four straight weekdays, officials said. The lanes were reopened within minutes of Mr. Foye's email on Sept. 13.

Some Bergen County Democrats were livid over the sudden closures. Senate Majority Leader Loretta Weinberg, a Democrat who represents the county, wrote to authority Commissioner William Schuber to express her dismay last month, saying she was at a "loss for words" about the closure, according to a copy of the letter reviewed by The Wall Street Journal.

"This whole traffic jam still remains a mystery," she said Tuesday.

Mayor Sokolich said he hasn't received answers to his request for information about why the authority ordered the closures. Still, the mayor said he was a supporter of many of Mr. Christie's policies, and didn't believe that the closures were intended to punish him, a theory he said had been the subject of "rumors."

—Heather Haddon contributed to this article.

Write to Ted Mann at ted.mann@wsj.com

A version of this article appeared October 2, 2013, on page A15 in the U.S. edition of The Wall Street Journal, with the headline: Port Chief Fumed Over Bridge Jam.

Rechler, Scott

From: Rechler, Scott
Sent: Friday, December 06, 2013 6:46 PM
To: Samson, David
Subject: Re: Fwd:

Thanks for forwarding.

Scott Rechler
CEO and Chairman
RXR Realty

> On Dec 6, 2013, at 5:21 PM, "Samson, David" wrote:
>
>
>
> Port Authority official resigns amid GWB lane closure controversy
> Friday, December 6, 2013 Last updated: Friday December 6, 2013, 5:08 PM
> BY SHAWN BOBURG<http://www.northjersey.com/authors/?name=SHAWN%20BOBURG>
> STAFF WRITER
> The Record
> Print<javascript:;> | E-mail<javascript:;>
>
> The Christie appointee at the center of a controversy over unannounced lane closures on the George Washington Bridge has decided to resign from the Port Authority, The Record has learned.
> [David Wildstein, appointed by Governor Christie as director of Interstate Capital Projects at the Port Authority of New York and New Jersey, appearing at a meeting Feb. 9, 2012.]<http://media.northjersey.com/images/0304A_WildsteinJump70p.jpg>
> KEVIN R. WEXLER/STAFF PHOTOGRAPHER
> David Wildstein, appointed by Governor Christie as director of Interstate Capital Projects at the Port Authority of New York and New Jersey, appearing at a meeting Feb. 9, 2012.
> [On Sept. 12, cars were backed up at the tolls because the approach to the tolls has been narrowed to one toll, seen on far right.]<http://media.northjersey.com/images/11222013_tolls_DNGCM.jpg>
> AMY NEWMAN/STAFF PHOTOGRAPHER
> On Sept. 12, cars were backed up at the tolls because the approach to the tolls has been narrowed to one toll, seen on far right.
>
> David Wildstein, the agency's director of Interstate Capital Projects, submitted his resignation letter Friday, days before a legislative hearing to investigate the lane closures. Wildstein said he plans to leave on Jan. 1 "to pursue other opportunities."
>
> "My plan was to leave the agency at some point next year, but the Fort Lee<http://www.northjersey.com/fortlee> issue has been a distraction, and I think it's better to move on earlier," he wrote in a letter to the agency's Deputy Executive Director, Bill Baroni. "I am grateful to you and Governor Christie<http://www.northjersey.com/news/state/governor/> for the opportunity to serve."
>
> News of Wildstein's resignation came on the same day two more Port Authority officials were ordered to testify before New Jersey lawmakers on Monday about the unannounced lane closures in September.

>
> The legislative panel sent subpoenas to Cedric Fulton, the Port Authority's director of tunnels, bridges and terminals, and Robert Durando, the manager of the Fort Lee<http://www.northjersey.com/fortlee> bridge, ordering them to appear before a committee investigating whether the lane closures were politically motivated to punish Fort Lee<http://www.northjersey.com/fortlee>'s mayor.
>
> A spokesman for Democratic Assemblyman John Wisniewski, chairman of the transportion committee, confirmed on Friday afternoon that both officials were summoned to Trenton to testify Monday. It's not clear if the officials intend to comply; a Port Authority spokesman did not immediately respond to a request for comment.
> Wildstein would not comment beyond announcing his resignation.
>
> The hearing threatens to expose divisions within the bi-state agency between governors on both sides of the Hudson. The lane closures, which caused heavy traffic delays in Fort Lee<http://www.northjersey.com/fortlee>, were ordered by Wildstein without notification to the public, local officials, or the agency's executive director.
>
> The executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, has said he intends to testify after he received a subpoena last week.
>
> Foye called the closures "abusive" and said they were potentially illegal in an internal e-mail that was leaked to the media. Earlier this week, while saying he intended to testify, he said he stands by the e-mail. The Fort Lee<http://www.northjersey.com/fortlee> Mayor, Mark Sokolich, initially said he believed the closures were "punitive" but has since backed away from that statement. Sokolich, a Democrat, was asked to endorse Christie for re-election in September but declined.
>
> Christie previously called the notion that it was political retribution "crazy." His top appointee at the agency, Bill Baroni, testified before the same panel last week and said the lane closures were part of a simple traffic study to determine whether too many toll lanes are dedicated to traffic from a local access ramp.
>
> Closing two of the three lanes dedicated to traffic from the local ramp reduced wait times for other traffic, he said. But an internal e-mail written by Foye has led to speculation that the lane closures were something more sinister. Foye said he was not notified about the lane closures in advance; and he reversed them after finding out about them.
>
> Former Port Authority officials interviewed have also said that such decisions on a major facility are typically preceded by several meetings with police, traffic engineers and other agency officials. In this case, Baroni testified, the idea came from the president of the Port Authority police union. It was then ordered by Wildstein, a former political consultant who went to high school with Christie. Wildstein has the title of director of Interstate Capital Projects but wields enormous power and has been described as the Christie administration's eyes and ears within the agency.
> - See more at:
http://www.northjersey.com/news/More_Port_Authority_officials_ordered_to_testify_on_GWB_lane_closures.html#sthash.MkddWpBk.dpuf
>
>
>
>

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> ***

>

> <image001.jpg>

> <image002.jpg>

Rechler, Scott

From: Rechler, Scott
Sent: Monday, November 25, 2013 8:57 PM
To: dsamsonı
Subject: feedback from press

FYI ... doesn't seem like it is going away based on these statements.

Wisniewski: Questions Remain on Port Authority's GWB Lane Closures

(TRENTON) - Assembly Deputy Speaker John Wisniewski (D-Middlesex), chairman of the Assembly transportation committee, released the following statement after hearing testimony from Bill Baroni, Deputy Executive Director of the Port Authority of New York and New Jersey, on the agency's decision to close - without prior public notice - access lanes to the George Washington Bridge in Fort Lee from Sept. 9 to Sept. 13:

"Mr. Baroni's testimony left many questions unanswered.
"This is an agency responsible for moving millions of people every day. For it to engage in a drastic maneuver such as closing lanes to the George Washington Bridge without notice and with the executive director being out of the loop raises serious concerns.
"It's very alarming that this agency could act so cavalierly and come here with a smug attitude and not be forthcoming. Even when we asked for the data Mr. Baroni relied on for his testimony, we were told his attorney would have to consider it. The data is the data, and should speak for itself. I'm not sure what the state secret is here.
"At best these lane closures were clumsy and ham-handed and not befitting an agency that is entrusted with handling billions of dollars every year. At worst, this was political mischief by, among others, a political appointee who was not made available for testimony. Either way, it's troubling that an agency this large could have that little accountability.
"We're going to consider what we do next.
"Executive Director Foye said he wasn't available today, so we've asked him to give us dates that he'd be available to come and we'd like to have him come and testify.
"We'd also like to have Mr. Wildstein come before the committee to answer why suddenly in September 2013 it was important to close these lanes

Weinberg Responds To PA Explanation For GWB Lane Closings

In Other Words: 'The Dog Ate My Homework'
TRENTON – Senate Majority Leader Loretta Weinberg issued the following statement on Monday in response to the explanation offered by the Port Authority at today's hearing on the lane closings to the George Washington Bridge:

> *"After two and one-half months of stonewalling this is the best story they could come up with!*
> *"Their so-called explanation was sketchy and evasive, reminding me of the proverbial excuse 'the dog ate my homework.' They failed to give an adequate accounting and they failed to answer the key questions.*

"If the original intention was really a traffic study I expect to get the documentation, as part of my Freedom of Information request to back up that claim, including the authorization and the role of Port Authority officials in the chain of command. I also expect to have the concerns expressed by the executive director of the authority addressed, including the suggestion that the closings were possibly illegal and potentially dangerous. And the authority can't 'lawyer up' in order to refuse to turn over the findings of the supposed traffic study.

"And for the authority to try to excuse away as a lack of communication the complete failure to notify other PA officials, the local towns and the public about the lane closings is an understatement that falls far short of credibility.

"Unfortunately, today's hearing doesn't put this issue to rest. I will continue to press for answers and to push for a full accounting until the full story is learned."

Rechler, Scott

From: Samson, David ·
Sent: Monday, November 25, 2013 5:06 PM
To: Rechler, Scott

FYI.

Port Official Explains Bridge Lane Closure Before Skeptical Lawmakers
Ted Mann
Wall Street Journal – Metropolis

An official from the Port Authority of New York and New Jersey defended the agency's temporary closure of local access lanes onto the George Washington Bridge in September before a skeptical committee of the state Assembly, while apologizing for failing to alert local officials and executives within the authority itself.

Bill Baroni, deputy executive director of the bi-state authority, said the closures arose from an internal effort to gauge the "fairness" of the existence of local access lanes for the borough of Fort Lee, N.J., which only sends a small fraction of the daily traffic across the span into New York.

"Is anybody going to argue this is fair?" Mr. Baroni asked the Assembly's transportation committee. Mr. Baroni said the authority's changes generated about two usable days' worth of data, showing that changing the lanes from restricted use for locals to general use by others heading for the bridge extended commuting times for Fort Lee drivers but lowered travel times for others. He did not provide the data, and said the Port Authority had not collected enough because of traffic problems in New York on the first day of the week, and the abrupt termination of the lane alterations when New York officials within the authority learned of the lane changes late in the week of Sept. 9.

The Democratic committee leadership was openly skeptical in a hearing that at times turned contentious, with vice-chairwoman Linda Stender at one point telling Mr. Baroni that the committee was trying to get at the real purpose of the lane closures, which snarled traffic throughout Fort Lee for a week before they were reversed by the authority's executive director, who had not been informed that the changes had been ordered.

The committee chairman, Assemblyman John Wisniewski, a former state Democratic Party chairman, at one point told Mr. Baroni, "You are masterful at avoiding the answer and we appreciate your dancing skills."

Afterward, Ms. Stender said she still suspected the lane closures had been the result not of a traffic study, as the authority initially said and as Mr. Baroni insisted Monday. Rather, she suspected the move was a show of political muscle toward the Democratic mayor of Fort Lee, Mark Sokolich, who was asked and declined to endorse Mr. Baroni's political patron, Gov. Chris Christie, for reelection, according to people familiar with the matter.

Mr. Sokolich suggested that the closures were "punitive" in a private letter to Mr. Baroni in September, but has since recanted. He was invited to testify but did not attend Monday's hearing.

Mr. Christie's official spokesman has said that the governor was not involved in questions of traffic patterns on the bridge and has referred questions to the authority since the controversy began. A spokesman for Mr. Christie's campaign said at the time that the notion the lane closures were political was "crazy."

Democrats in Trenton remained skeptical.

"I think he was sent to divert from the root question, which was, 'Was this done for political purposes, as opposed to for policy reasons?'" Ms. Stender said after the hearing.

"That there is not a paper trail or an email that explains the communication of how that was decided is ludicrous, and totally not believable," she said. "So it leads one to believe that somebody picked up a phone and made a phone call, and made (another) phone call because there was not legitimate purpose behind it. It was done to intimidate a mayor."

After his appearance, Mr. Baroni parried further inquiries about the lane changes and when he had learned of them. He declined to say why neither he, Mr. Foye, and other authority officials had ever explained their motives before Monday's hearing — including a press briefing last week in which Mr. Baroni and Mr. Foye refused to answer questions because of what they said was an ongoing internal review of the matter.

The results of that review were Mr. Baroni's testimony before the committee, he said. Asked why he had not explained the matter sooner, he would say only, "It's a beautiful day to be in Trenton."

Mr. Baroni, a former state senator and a top appointee of Mr. Christie at the authority, was an animated and at times genteelly combative witness. After months of failing to provide any detailed explanation of the purpose of the lane closures, Mr. Baroni and a pair of staffers arrived about 20 minutes late for the committee hearing, to the apparent surprise of some committee members. They had with them a large aerial photograph of the Jersey-side approach to the George Washington Bridge.

On it, Mr. Baroni sketched the movements of traffic cones that are used in normal circumstances to stake off a trio of lanes during rush hour to allow traffic from local streets exclusive access to three toll booths on the upper level of the bridge.

The deputy executive director also provided new detail about how the lane closures occurred. Mr. Baroni said that an official from the Port Authority Police Benevolent Association, its police department's union, suggested the lane changes in July to David Wildstein, a political operative and former Republican mayor who is another of Mr. Christie's allies within the authority, according to people familiar with the matter.

Mr. Wildstein made a series of calls to realign the lanes the morning of Sept. 9, according to people familiar with the matter, but had made his decision to conduct the traffic changes by Sept. 5, Mr. Baroni said. Mr. Baroni said he learned of the plans some time on the weekend before the lanes were changed. (Mr. Wildstein, whose job title is director of interstate capital projects, was invited to testify on Monday, along with Mr. Foye and authority police, but did not attend.)

Mr. Wildstein consulted with the Port Authority's internal engineering department to design "options" for changing the layout of lanes, Mr. Baroni said.

That account seems to run counter to the assessment that Mr. Foye gave his fellow executives in an outraged email in September, after he discovered the lane closures and ordered them reversed. In that email, Mr. Foye said that the relevant internal officials of the authority, including traffic engineers, leaders of the authority's bridge and tunnel division and the police, didn't receive appropriate consultation and didn't sign off on the closures before they happened.

Mr. Baroni acknowledged that the authority should have announced the planned closures more widely.

"Communication was flawed internally, communication was flawed with our neighbors — no question," he said.

But he repeatedly turned the conversation from the purpose of the closures — and especially from efforts to establish a timeline of how the plans were communicated to some officials within the authority — to a debate about the principle of setting aside local access to transportation infrastructure. Rattling off the names of highways in the districts of individual legislators, Mr. Baroni repeatedly returned to what he called the central question of fairness, as Mr. Wisniewski tried, without success, to divert the conversation back to the incidents of the week of Sept. 9.

Afterward, Mr. Wisniewski said he still wanted Messrs. Foye and Wildstein to appear before him and testify, and did not rule out issuing subpoenas compelling them to appear. He also said he suspected "political mischief," comparing Mr. Baroni to Claude Rains's disingenuous captain in Casablanca, who proclaims himself "shocked" at the discovery of gambling.

"Suddenly Bill Baroni is shocked there are three lanes dedicated to Fort Lee after three years at the Port Authority? The hiring of (David) Wildstein was required to bring this to light? I'm sure Mr. Wildstein's an intelligent man. He's also a political operative, he's a political appointee, and it does smell like political chicanery," Mr. Wisniewski said.

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Rechler, Scott

From: Samson, David
Sent: Monday, November 25, 2013 9:58 PM
To: Rechler, Scott
Subject: RE: feedback from press

we'll see.

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Sent: Monday, November 25, 2013 8:57 PM
To: Samson, David
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> *"And for the authority to try to excuse away as a lack of communication the complete failure to notify other PA officials, the local towns and the public about the lane closings is an understatement that falls far short of credibility.*
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Rechler, Scott

From: Samson, David
Sent: Thursday, December 12, 2013 10:14 AM
To: Rechler, Scott
Subject: Fwd: page 1 - the Record

Sent from my iPhone

Begin forwarded message:

Port Authority chairman silent on September lane closures on George Washington Bridge
Wednesday, December 11, 2013 Last updated: Thursday December 12, 2013, 12:45 AM
BY SHAWN BOBURG<http://www.northjersey.com/authors/?name=SHAWN%20BOBURG>
STAFF WRITER
The Record
Print<javascript:;> | E-mail<javascript:;> [Port Authority Chairman David Samson, center in 2012, with Deputy Executive Director Bill Baroni, left, and Chief Financial Officer Michael Fabiano. Samson has refused to address a GWB traffic foul-up in September. Three Democratic lawmakers from New York called for Baroni's resignation over the issue.]<http://media.northjersey.com/images/121113samson_dngnk.jpg>
MITSU YASUKAWA / STAFF PHOTOGRAPHER
Port Authority Chairman David Samson, center in 2012, with Deputy Executive Director Bill Baroni, left, and Chief Financial Officer Michael Fabiano. Samson has refused to address a GWB traffic foul-up in September. Three Democratic lawmakers from New York called for Baroni's resignation over the issue.

Related: Fort Lee Trial Review presentation<http://dng.northjersey.com/media_server/tr/2013/12/11port/PA1.pdf> (PDF)

When there were three-hour backups on the Outerbridge Crossing and Goethals Bridge in April 2011, the chairman of the Port Authority, a close adviser to Governor Christie<http://www.northjersey.com/news/state/governor/>, came down hard on the executives who run the agency.

"We consider this unacceptable," David Samson said publicly at the time. "It's unthinkable that we would have these problems."

Two-and-a-half years later, though, Samson is steering clear of another traffic jam — this one created by a Christie appointee who ordered an unannounced study on the George Washington Bridge in September that temporarily turned Fort Lee<http://www.northjersey.com/fortlee> into a parking lot and has led to speculation that the world's busiest bridge was used as a tool to exact political revenge.

Related: Email from Port Authority engineer Jennifer Bates to GWB manager Robert Durando<http://dng.northjersey.com/media_server/tr/2013/12/11port/PA2.pdf> (PDF)

Samson remained silent on Tuesday, even as the Port Authority's Inspector General announced he had launched an investigation to see if there was criminal wrongdoing. National Democrats began taking shots at Christie, signaling they see the bridge flap as potentially damaging to his possible rise to higher office. And New York legislators called for the resignation of Christie's top executive appointee at the agency, Deputy Executive Director Bill Baroni.

Samson, the agency's top policy official, has been in the shadows through the improbable traffic-cone controversy. He hasn't returned phone messages or emails this week, and on Wednesday, he declined to talk to a reporter at his law office in West Orange. For the last two months, he has also inexplicably and uncharacteristically skipped the press conferences held after the commissioners' monthly meetings when reporters asked questions about the issue.

Related: Email chain between engineers, Port Authority's David Wildstein and GWB staff<http://dng.northjersey.com/media_server/tr/2013/12/11port/PA3.pdf> (PDF)

It's a break from the past.

For decades, the Port Authority's chairman and executive director have taken the lead when responding to public controversies, said Princeton Professor Jameson W. Doig, who wrote a book about the history of the agency. Perhaps none of those past controversies have seemed so small on the surface as a decision to close two lanes. But Samson's retreat may reflect the Christie administration's uncertainty about how to handle the potential scandal.

Christie, who has laughed off questions about the incident as much ado about traffic cones, has not responded to multiple requests for comment since Monday's sworn testimony by two Port Authority officials that David Wildstein, a high school classmate of the governor and a powerful agency official, ordered the study on short notice and told one bridge worker to keep it a secret from the commuting public and local officials in Fort Lee<http://www.northjersey.com/fortlee>, even borough police.

Related: Another email chain between engineers, Port Authority's David Wildstein and GWB staff<http://dng.northjersey.com/media_server/tr/2013/12/11port/PA4.pdf> (PDF)

The Port Authority officials called the study "odd" and "unprecedented" and said they warned Wildstein it would end badly. And the agency's top executive from New York said he thought the lane closings were abusive and illegal. Even before their testimony, Wildstein had agreed to step down late last week, calling the issue "a distraction." Internal e-mails obtained by The Record do show that Wildstein asked the agency's traffic engineers to conduct a study of some sort, although the records also show that those engineers predicted the chaos in Fort Lee<http://www.northjersey.com/fortlee>. Wildstein told them to do it anyway.

It's unclear if Samson knew about the study or has inquired about it since.

He holds a singular position in an agency whose power structure is diffuse and complex: The governors of New York and New Jersey each make appointments to the 12-member board of commissioners, as well as the top two executives responsible for running the agency day-to-day. They oversee a workforce of long-term technocrats skilled in transportation, commerce and real estate.

Since becoming a Port Authority commissioner, Samson has led initiatives to make the agency more transparent, but he also presided over the approval of the largest ever toll hikes, which were criticized for being rushed without enough public input. But Samson, a former New Jersey attorney general who Christie often refers to as "The General," has been the authority's public face as much as anyone. He also has strong ties to Christie outside the agency.

He led the governor's 2010 transition team when Christie came into office. A few of Christie's former Cabinet members, including former U.S. Sen. Jeffrey Chiesa, either previously worked or now work at Samson's law firm, Wolff Samson. He also was among the group of close advisers who went to Arizona with Christie last month when he took on his new position as chairman of the Republican Governors Association, a sign that Samson is seen as important to Christie's potential run for national office.

Democrats, sensing weakness, have begun seizing on the bridge flap.

"Chris Christie and his administration need to come clean on the facts," a spokesperson for a recently launched political action committee, Correct the Record, said Wednesday about the controversy. The group says its mission is to defend Democratic presidential candidates and hold Republicans accountable. The National Democratic Committee issued similar statements Tuesday and Wednesday, reflecting Christie's role as an early front-runner for the 2016 Republican presidential nomination.

Attacks are also coming from across the Hudson. Three Democratic lawmakers from New York — state Sen. Adriano Espaillat, Assembly member Gabriella Rosa and New York City Council member Ydanis Rodriguez — issued a statement calling for Baroni's resignation on Wednesday.

"We cannot tolerate the disturbing precedent set by Mr. Baroni's actions – that taxpayer-funded infrastructure can be used to settle personal and political feuds," they said.

And Michael Nestor, from the Port Authority Inspector General's Office, the independent investigative arm of the agency, said Wednesday the office had begun an investigation.

"We want to know, No. 1, how and why did this happen; No. 2, who was behind it all, and No. 3, was there any criminal violation?" Nestor said.

Meanwhile, Samson's secretary at his law firm said he was in a meeting and would be unavailable all day.

In the past, Samson has not shied away from the public stage. Although, commissioners' meetings are usually staid affairs with little discussion or disagreement, Samson has on occasion acknowledged the Port Authority's reputation for being unresponsive to the public, as he did when he criticized the April 2011 traffic jams at the bridges that connect New Jersey to Staten Island. At the time, he excoriated Executive Director Christopher O. Ward, a New York appointee, for a shortage of toll collectors that led to the massive delays on a busy holiday in 2011.

Wildstein, the official who ordered the traffic study, has not suffered the same fate. He received praise from a Christie spokesman on Friday, after announcing he would resign from his $150,000 job as director of interstate capital projects, effective Jan. 1.

The only answers from Christie's camp have come from Baroni. He told skeptical legislators at a separate hearing two weeks ago that the exercise was a simple traffic study. He was not under oath. And his testimony was at odds with Monday's sworn testimony by the three officials who were subpoenaed.

Emails obtained by The Record indicate that Wildstein took steps to perform a study of some kind — although agency officials testified Monday that the process for a study typically starts years, not days, in advance.

The emails show that on Aug. 29 the agency's chief traffic engineer, Jose Rivera, sent Wildstein and the agency's chief engineer, Peter Zipf, four slides showing different configurations on the bridge plaza, including merging three access lanes into one. On Friday, Sept. 6, Wildstein ordered engineers to put the plan in place on the following Monday. Zipf sent another e-mail to Rivera and three others that day asking for "daily summaries of Traffic impacts--both positive and negative." Engineers did so.

At just after 5 p.m. on Thursday, Daniel Jacobs, a manager in the department that oversees tunnels and bridges, emailed Mark Muriello, another high-ranking employee within the department, a document entitled, "Reallocation of Toll Lanes at the GWB: An EARLY assessment of the benefits of the trial."

The report said the combined delays experienced by motorists from the Fort Lee<http://www.northjersey.com/fortlee> totaled 2,800 hours during the four busiest morning commuting hours, while Route 95 traffic saved a total of only 966 combined hours over that time. However, the number of cars that use the Route 95 approach far exceeds those that use the local approaches. The report referenced the predictions, made prior to the test, of traffic lines on Fort Lee<http://www.northjersey.com/fortlee> streets 600 vehicles long. Those lines were predicted to last until noon. "This matches actual performance observed by GWB management," the report states.

Email: boburg@northjersey.com<mailto:boburg@northjersey.com>

- See more at:
http://www.northjersey.com/news/Port_Authority_chairman_silent_on_GWB_lane_closure_controversy.html?page=all#sthash.srm81cML.dpuf

Rechler, Scott

From: Rechler, Scott
Sent: Wednesday, October 02, 2013 9:53 AM
To: 'Samson, David'
Subject: RE: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

Not good but don't think it came from us. You around today to catch up on a few unrelated items?

From: Samson, David
Sent: Wednesday, October 02, 2013 9:38 AM
To: Rechler, Scott
Subject: FW: Clip from Alan Marcus: The Wall Street Journal: Port Chief Fumed Over Bridge Jam

these continued leaks will create increased problems for our relations.

Port Chief Fumed Over Bridge Jam

The Wall Street Journal

October 1, 2013

The abrupt closure of local access lanes to the George Washington Bridge last month triggered a pointed private response from the executive director of the Port Authority of New York and New Jersey, who said the move likely broke state and federal laws and could have caused deaths because of snarled traffic.

To view the full text, please click here.

- October 1, 2013, 10:40 p.m. ET

Port Chief Fumed Over Bridge Jam

Patrick Foye Fired Off an Email Message After Learning of Lane Closures

By

- TED MANN
- CONNECT

The abrupt closure of local access lanes to the George Washington Bridge last month triggered a pointed private response from the executive director of the Port Authority of New York and New Jersey, who said the move likely broke state and federal laws and could have caused deaths because of snarled traffic.

The executive director, Patrick Foye, fired off an email message early on the morning of Sept. 13, after he learned of the lane closures and subsequent traffic backups in Fort Lee, N.J., from a daily internal list of pending media inquiries.

Mr. Foye's blistering email, which was sent to top executives of the authority and was reviewed by The Wall Street Journal, denounced the closures as "abusive" and pledged to investigate "how PA process was wrongfully subverted and the public interest damaged to say nothing of the credibility of this agency."

"I pray that no life has been lost or trip of a hospital- or hospice-bound patient delayed," Mr. Foye wrote, a reference to ambulances caught in traffic.

The closure of the lanes was seen by some in Fort Lee and Bergen County as retribution from surrogates of Republican Gov. Chris Christie—who shares control of the authority and its bridges with New York Gov. Andrew Cuomo—at Fort Lee Mayor Mark Sokolich, a Democrat who hasn't endorsed Mr. Christie for re-election.

Mr. Christie's campaign has denied the suggestion, and called the notion "crazy." The governor's appointees at the authority have said that the lanes were closed to conduct a traffic study, though they have declined to provide any supporting materials or findings.

Mr. Christie's spokesman referred questions to the Port Authority, where a spokesman declined to comment.

Mr. Foye, an appointee of Mr. Cuomo, wrote that the lane closures were made without informing numerous interested parties, including himself, local and Port Authority police, Mr. Sokolich, and commuters.

His email also throws into question the Port Authority's prior explanation for the shutdown: that the lanes were closed so the authority could perform the traffic study.

In the email, Mr. Foye listed the divisions within the authority that weren't consulted before the traffic pattern was changed, including the police department, and the Traffic and Engineering division.

The authority's public response has described the lane closures as part of "a week of study at the George Washington Bridge of traffic safety patterns."

People familiar with the matter disputed that. "There was no study," one of them said.

Mr. Foye's email was sent to Robert Durando, the general manager of the bridge for more than a decade, and Cedrick Fulton, director of the Tunnels, Bridges and Terminals Department and Mr. Durando's boss. Copied on the message were the highest level leadership of the authority, including Mr. Christie's two top appointees, Chairman David Samson and Deputy Executive Director Bill Baroni.

Mr. Durando referred inquiries to the authority's press office. Requests to speak to top port executives weren't answered Tuesday.

The lane closures winnowed the approach routes from Fort Lee to the bridge to one from three, and triggered massive congestion in Fort Lee for four straight weekdays, officials said. The lanes were reopened within minutes of Mr. Foye's email on Sept. 13.

Some Bergen County Democrats were livid over the sudden closures. Senate Majority Leader Loretta Weinberg, a Democrat who represents the county, wrote to authority Commissioner William Schuber to express her dismay last month, saying she was at a "loss for words" about the closure, according to a copy of the letter reviewed by The Wall Street Journal.

"This whole traffic jam still remains a mystery," she said Tuesday.

Mayor Sokolich said he hasn't received answers to his request for information about why the authority ordered the closures. Still, the mayor said he was a supporter of many of Mr. Christie's policies, and didn't believe that the closures were intended to punish him, a theory he said had been the subject of "rumors."

—Heather Haddon contributed to this article.

Write to Ted Mann at ted.mann@wsj.com

- A version of this article appeared October 2, 2013, on page A15 in the U.S. edition of The Wall Street Journal, with the headline: Port Chief Fumed Over Bridge Jam.

From: Foye, Patrick
Sent: Monday, September 16, 2013 12:21 PM
To: 'srechler(Garten, David
Subject: Fw: Wall Street Journal inquiry -- Fort Lee toll booths

Fyi

From: Coleman, Steve
Sent: Monday, September 16, 2013 12:18 PM
To: Foye, Patrick; Baroni, Bill
Cc: Ma, John; Wildstein, David; MacSpadden, Lisa
Subject: Wall Street Journal inquiry -- Fort Lee toll booths

WSJ reporter Ted Mann called, looking to do a story on the Fort Lee toll booth issue. Ted said that some Wall Street Journal editors commute to work via the GWB and through the toll booths in question and became stuck in the traffic last week. They initially were unsure of what was going on until they read John Cichowski's stories in the Bergen Record. Ted has questions about the traffic study that was referenced in Cichowski's stories and what prompted the closing of the toll booths.

Please advise on how we should respond.

From: Garten, David
Sent: Thursday, December 12, 2013 4:14 PM
To: Buchbinder, Darrell
Cc: Foye, Patrick
Subject: more subpoenas

Wisniewski Issues 7 More Subpoenas as Part of Investigation into Port Authority's George Washington Bridge Lane Closings

Seeks Documents and Communications from Top PANYNJ Officials

(TRENTON) - Assembly Deputy Speaker John Wisniewski on Thursday announced he has issued seven more subpoenas as part of his continued investigation into the Port Authority of New York and New Jersey's decision to close access lanes from Fort Lee to the George Washington Bridge in September without public notice or explanation.

The subpoenas seek documents and communications from the following key Port Authority officials:

- Patrick Foye; Executive Director
- Bill Baroni; Deputy Executive Director;
- David Wildstein; Director of Interstate Capital Projects;
- Cedrick Fulton, Director of Tunnels, Bridges and Terminals;
- Robert Durando, General Manager of the George Washington Bridge;
- Paul Nunziato, President of the Port Authority Police Benevolent Association; and
- Darcy Licorish, Port Authority Police Department.

"We have heard from four key Port Authority officials, yet we still don't have any clear explanation for why and how these lanes were closed without public notice, putting public safety at risk throughout an entire community of our state," said Wisniewski (D-Middlesex), chairman of the Assembly transportation committee that has held two hearings on the matter. "Mr. Baroni was especially evasive, and subsequent testimony called into question the honesty of his remarks. These documents should provide key insight into whether these lane closings resulted from political operatives who were running amuck, or just sheer incompetence. Either answer is unacceptable, but the public deserves to know the truth."

Baroni claimed the lanes were closed for a traffic study. Fulton and Durando on Monday told the Assembly transportation panel that Wildstein ordered the lanes closed without public notice, but Foye told the committee on Monday that no traffic study existed. The Fort Lee mayor had implied the lanes were closed for political retribution.

Wildstein recently announced his resignation, but will be staying at the Port Authority through Jan. 1 making his $150,000 annual pay without job responsibilities.

Wisniewski has called for Wildstein and Baroni to be removed from the Port Authority by Gov. Chris Christie.

"Serious questions remain as to who plotted to close these lanes, who knew of the plans and what the real goal was here," Wisniewski said. "We know there was no traffic study. We know Mr.

Baroni was evasive, unprofessional and seemingly less than truthful. We know Mr. Wildstein tried to keep these lanes closings hushed. We know Mr. Foye was left in the dark. We know Gov. Christie has scoffed at this serious issue. What we don't know is how exactly this happened. These subpoenas for documents are the next step in our investigation and will open the door to more possible subpoenas for testimony."

All seven subpoenas seek by Dec. 19:

· All documents and correspondence, produced between August 1, 2013 and the present date between Governor Chris Christie or any member of his administration and/or any employee, officer, or executive of the Port Authority, concerning the reduction from three to one of the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from September 9, 2013 through September 13, 2013;

· All documents and correspondence, produced between August 1, 2013 and the present date, between and among any employee, officer, or executive of the Port Authority, including any documents and correspondence sent or received by Patrick Foye, Executive Director; Bill Baroni, Deputy Executive Director; David Wildstein, Director of Interstate Capital Projects; Cedrick Fulton, Director of Bridges, Tunnels, and Terminals; Robert Durando, General Manager of the George Washington Bridge; Paul Nunziato, President of the Port Authority Police Benevolent Association; and Darcy Licorish of the Port Authority Police Department concerning the reduction from three to one of the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from September 9, 2013 through September 13, 2013.

The subpoena to Foye also seeks:

· As referenced by Patrick Foye during the Assembly Transportation, Public Works and Independent Authorities Committee meeting on December 9, 2013, a copy of the media pendings from September 9, 2013 through September 13, 2013;

· As referenced by Patrick Foye during the Assembly Transportation, Public Works and Independent Authorities Committee meeting on December 9, 2013, a timeline of events surrounding the reduction from three to one of the eastbound Fort Lee, New Jersey access lanes to the George Washington Bridge from September 9, 2013 through September 13, 2013, including, but not limited to, the date when it was determined that Darcy Licorish would be promoted, the date of Mr. Licorish's promotion, the dates and times when Mr. Wildstein ordered individuals to close the access lanes, the date and time when Mr. Licorish was notified about the lane closures, and the date and time of any communications between Fort Lee borough police, mayor, or staff and the Port Authority; and

· As referenced by Patrick Foye during the Assembly Transportation, Public Works and Independent Authorities Committee meeting on December 9, 2013, estimates for the average delay to traffic at the Fort Lee entrance to the George Washington Bridge from September 9, 2013 through September 13, 2013 and the travel time impact for every other approach to the bridge from September 9, 2013 through September 13, 2013.

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 5:11 PM
To: Scott Rechler; Foye, Patrick; Garten, David
Subject: Record story

David Wildstein, the agency's director of Insterstate Capital Projects, submitted his resignation letter Friday, days before a legislative hearing to investigate the lane closures. Wildstein said he plans to leave on Jan. 1 "to pursue other opportunities."

"My plan was to leave the agency at some point next year, but the Fort Lee issue has been a distraction, and I think it's better to move on earlier," he wrote in a letter to the agency's Deputy Executive Director, Bill Baroni. "I am grateful to you and Governor Christie for the opportunity to serve."

News of Wildstein's resignation came on the same day two more Port Authority officials were ordered to testify before New Jersey lawmakers on Monday about the unannounced lane closures in September.

The legislative panel sent subpoenas to Cedric Fulton, the Port Authority's director of tunnels, bridges and terminals, and Robert Durando, the manager of the Fort Lee bridge, ordering them to appear before a committee investigating whether the lane closures were politically motivated to punish Fort Lee's mayor.

A spokesman for Democratic Assemblyman John Wisniewski, chairman of the transporation committee, confirmed on Friday afternoon that both officials were summoned to Trenton to tesify Monday. It's not clear if the officials intend to comply; a Port Authority spokesman did not immediately respond to a request for comment.

Wildstein would not comment beyong announcing his resignation.

The hearing threatens to expose divisions within the bi-state agency between governors on both sides of the Hudson. The lane closures, which caused heavy traffic delays in Fort Lee, were ordered by Wildstein without notification to the public, local officials, or the agency's executive director.

The executive director, Pat Foye, an appointee of New York Gov. Andrew Cuomo, has said he intends to testify after he received a subpoena last week.

Foye called the closures "abusive" and said they were potentially illegal in an internal e-mail that was leaked to the media. Earlier this week, while saying he intended to testify, he said he stands by the e-mail. The Fort Lee Mayor, Mark Sokolich, intially said he believed the closures were "punitive" but has since backed away from that statement. Sokolich, a Democrat, was asked to endorse Christie for re-election in September but declined.

Christie previously called the notion that it was political retribution "crazy." His top appointee at the agency, Bill Baroni, testified before the same panel last week and said the lane closures were part of a simple traffic study to determine whether too many toll lanes are dedicated to traffic from a local access ramp.

- See more at:
http://www.northjersey.com/news/More_Port_Authority_officials_ordered_to_testify_on_GWB_lane_closures.html#sthash.XXIMQoYT.mtARY8VP.dpuf

PANYNJ

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
==

The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, **a study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies:**

1.0 INTRODUCTION
Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications
Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation
Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ

Prepared By:

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

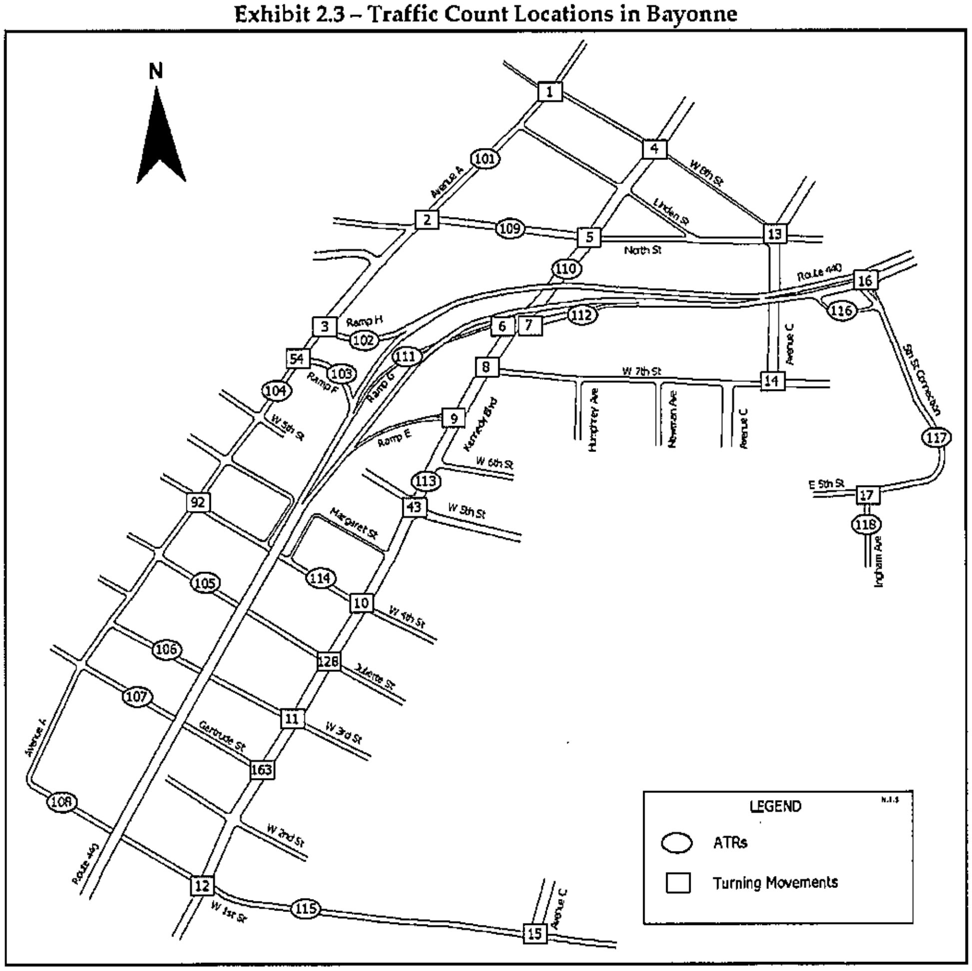

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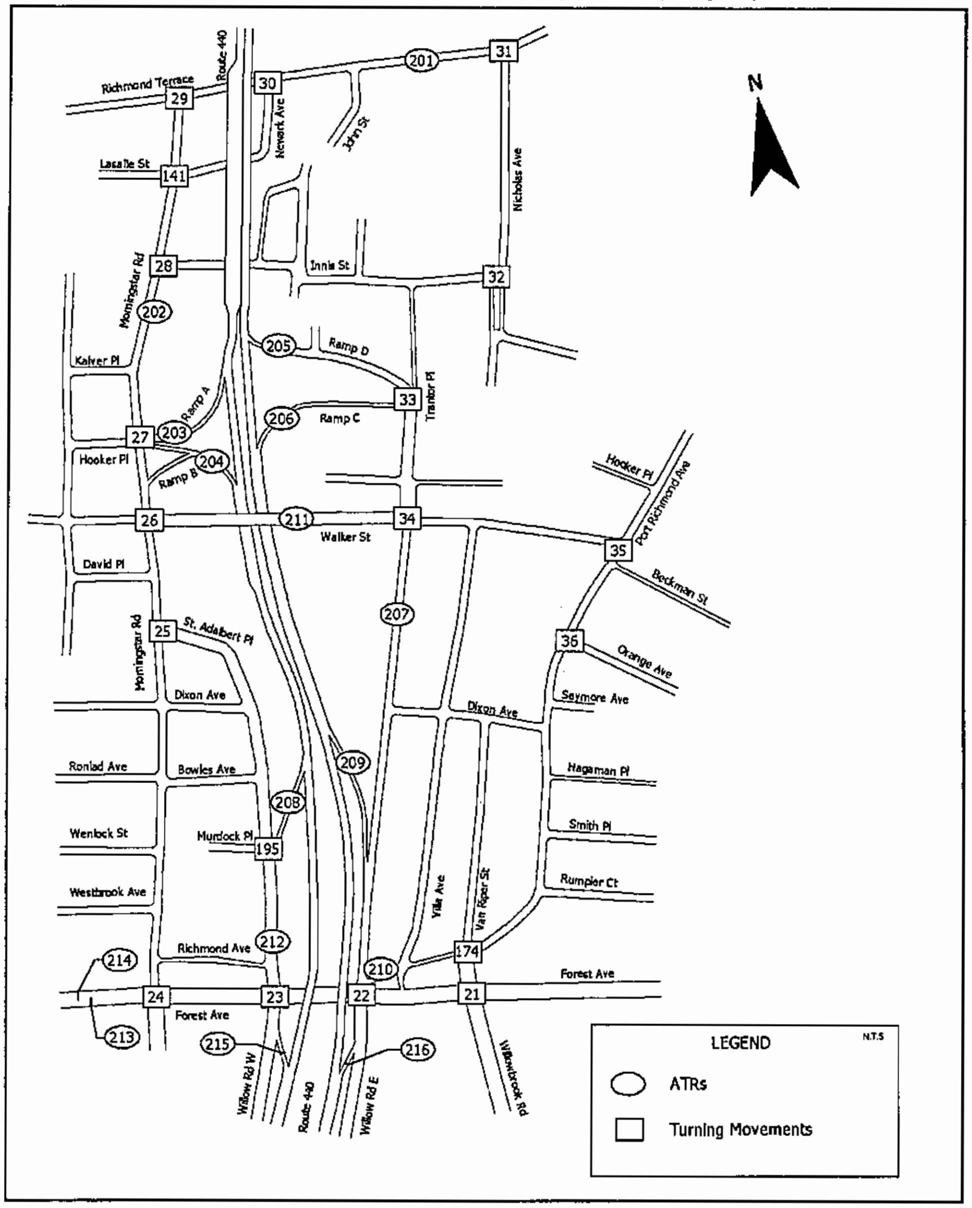
Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

	Street Closures in Staten Island						Street Closures in Bayonne				
Construction Stage	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and **3.4** show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

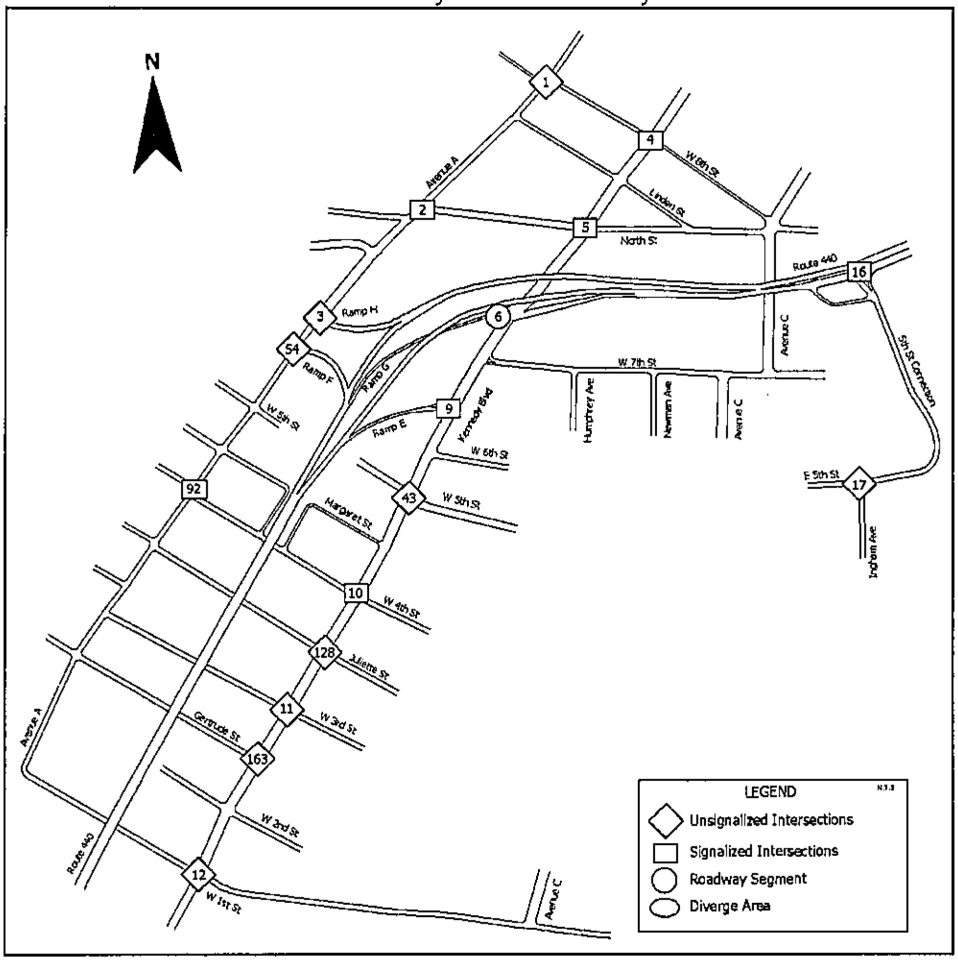


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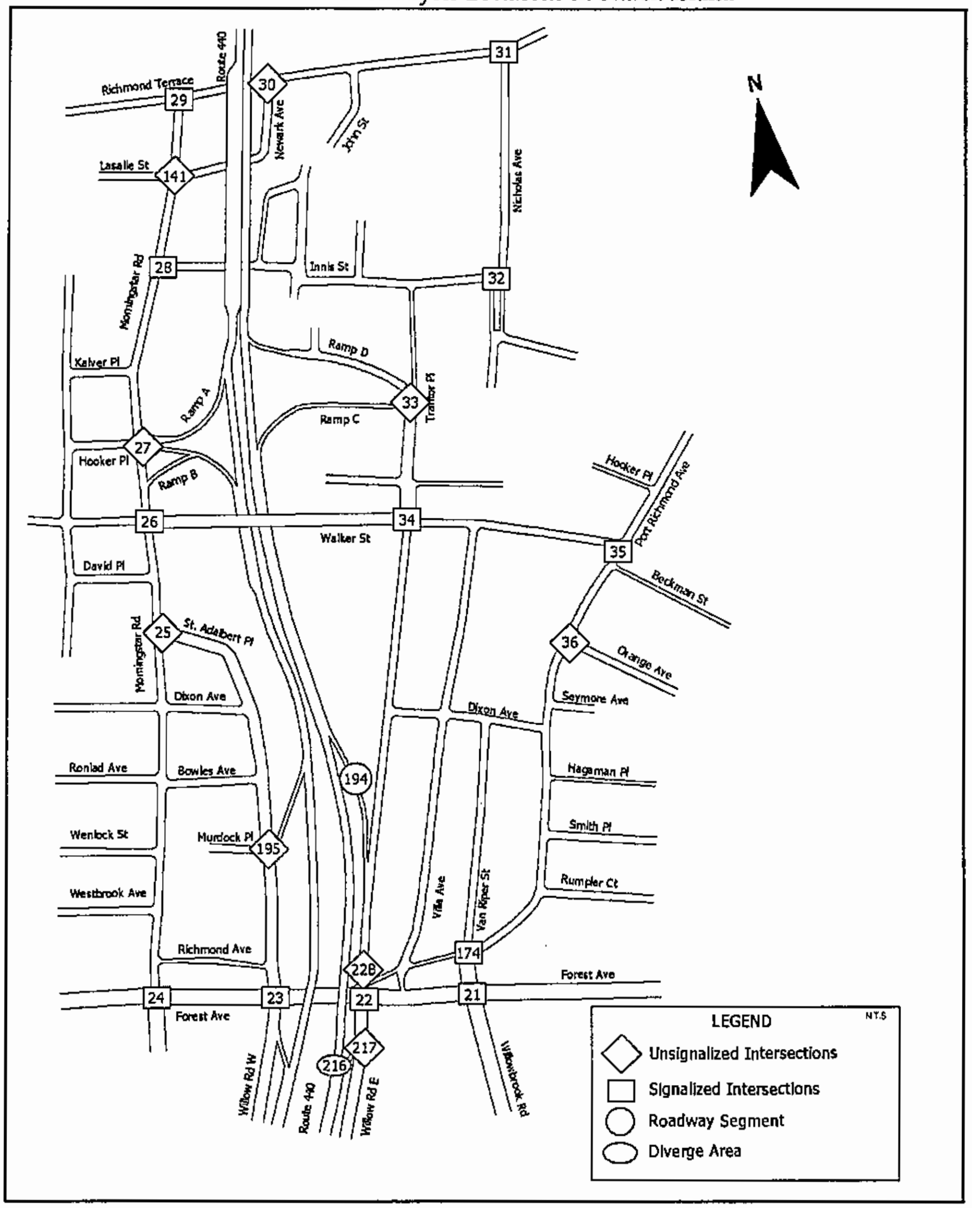
Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

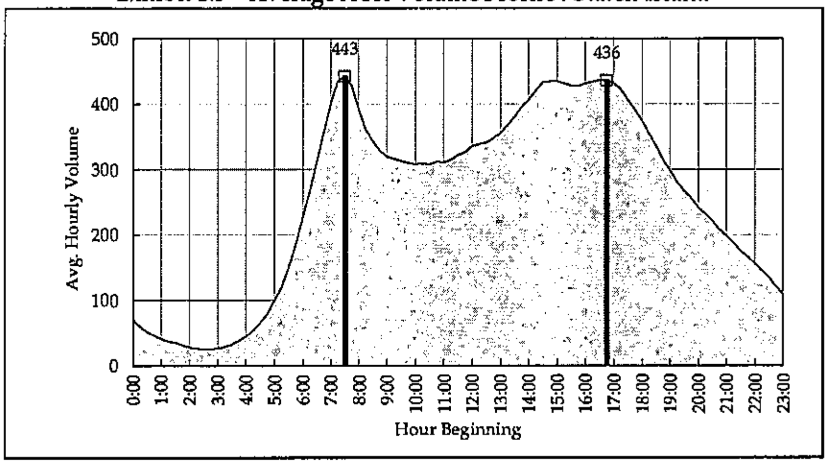
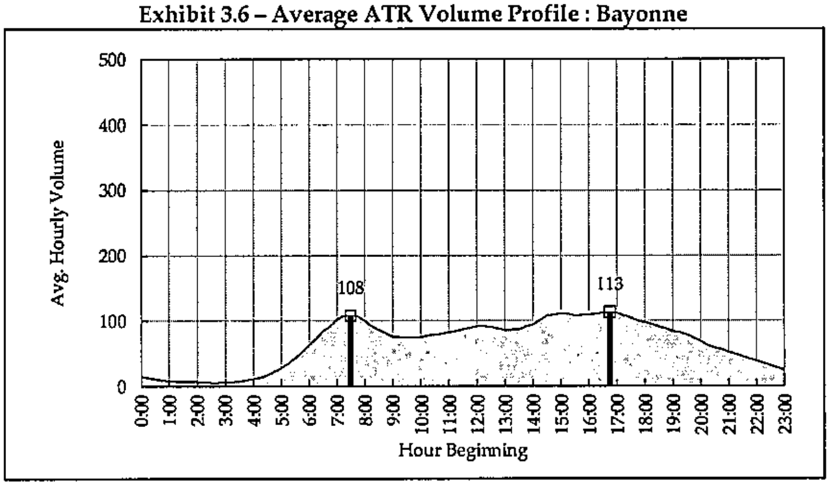


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit 3.7**, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the 2000 *Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1.** The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Destination / Origin	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

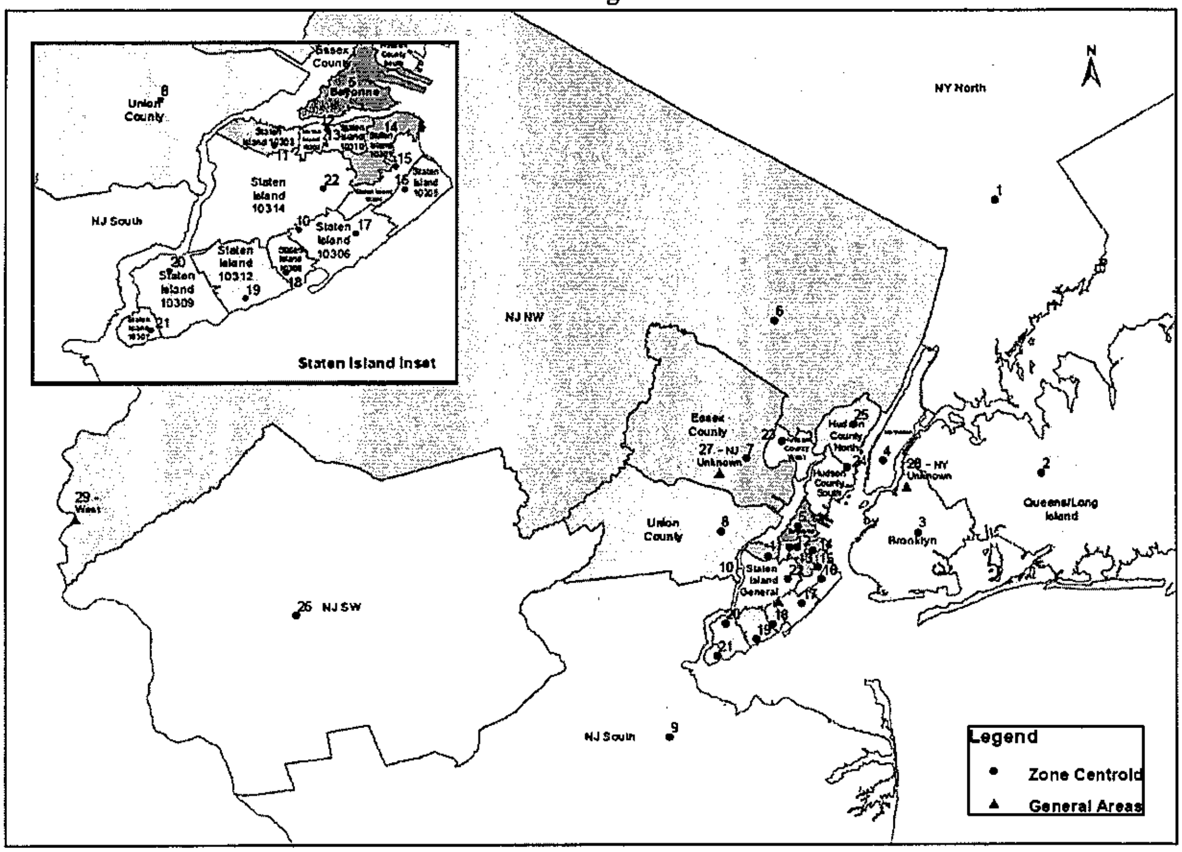


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
	9	J.F. Kennedy Boulevard and Ramp E					-	-				
	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
	16	Route 440 and 5th Street Connection					-	-				
	17	Ingham Avenue and E. 5th Street					-	-				
	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
	23	Forest Avenue and Willow Road West							-	-	-	-
	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
	25	Morningstar Road and St. Adalbert Place							-	-	-	-
	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
	28	Morningstar Road and Innis Street			-	-	-	-				
	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
	30	Richmond Terrace & Newark Avenue			-	-	-	-				
	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
	32	Nicholas Avenue and Innis Street			✓	-	-	-				
	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
	34	Trantor Place and Walker Street			✓	✓	✓	✓				
	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
	141	Morningstar Road and Newark Avenue			✓	-	-	-				
	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
	195	Route 440 SB ramp to Willow Road West							-	-	-	-
	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓ *Significant Impact*

\- *Location was analyzed, and no traffic impact was identified.*

(blank box) *Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit** 5.2 shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit** 5.3 shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit** 5.6 shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1.**

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10.** These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	Percentage
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1.** This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22.** These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21.** This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

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Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

Hour Beg.	New York Bound: 2017 Traffic Volume	NY No Build: Density (pc/mi/ln)	NY No Build: Level of Service	NY Const. Build: Density (pc/mi/ln)	NY Const. Build: Level of Service	NY Delay (min)	NY Significant Impact ?	New Jersey Bound: 2017 Traffic Volume	NJ No Build: Density (pc/mi/ln)	NJ No Build: Level of Service	NJ Const. Build: Density (pc/mi/ln)	NJ Const. Build: Level of Service	NJ Delay (min)	NJ Significant Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

Hour Beg.	NY Bound: 2017 Traffic Volume	NY Bound: No Build Density (pc/mi/ln)	NY Bound: No Build Level of Service	NY Bound: Const. Build Density (pc/mi/ln)	NY Bound: Const. Build Level of Service	NY Bound: Delay (min)	NY Bound: Significant Impact ?	NJ Bound: 2017 Traffic Volume	NJ Bound: No Build Density (pc/mi/ln)	NJ Bound: No Build Level of Service	NJ Bound: Const. Build Density (pc/mi/ln)	NJ Bound: Const. Build Level of Service	NJ Bound: Delay (min)	NJ Bound: Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
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The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, **a study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION

Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications

Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation

Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ

Prepared By:

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

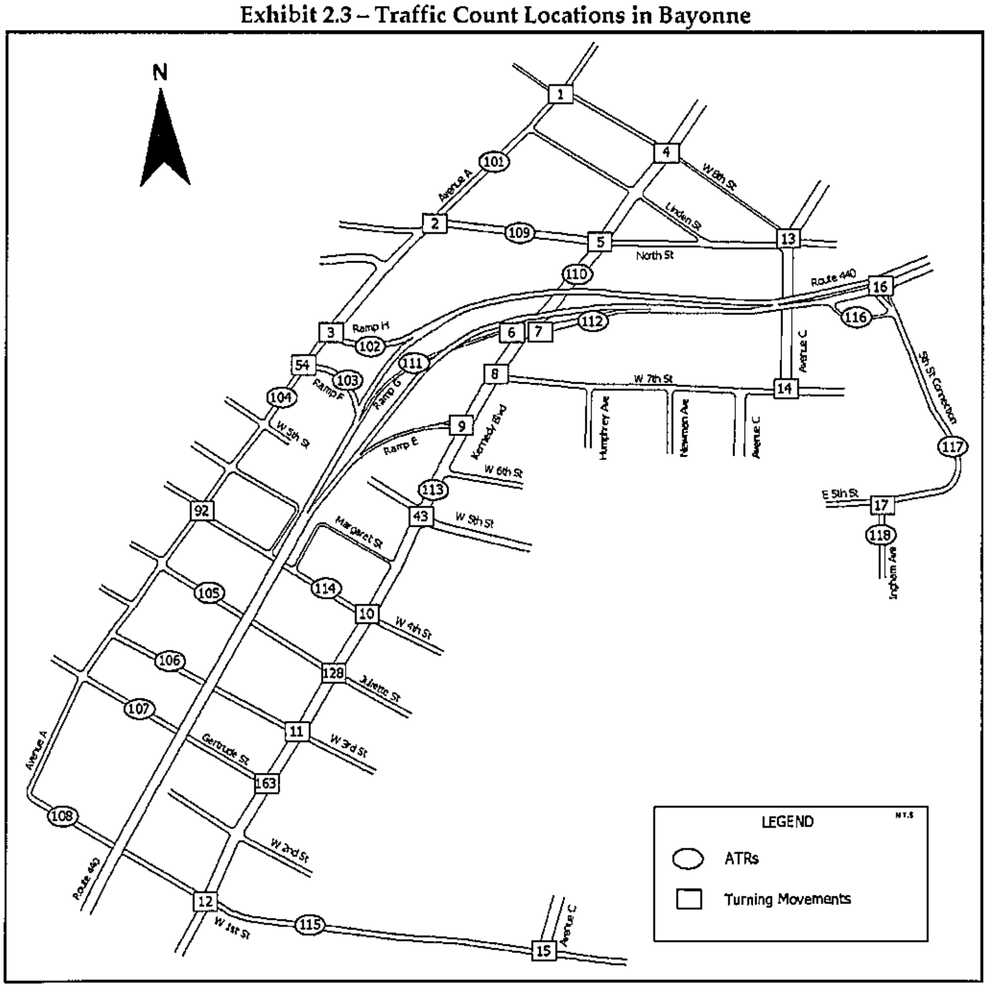
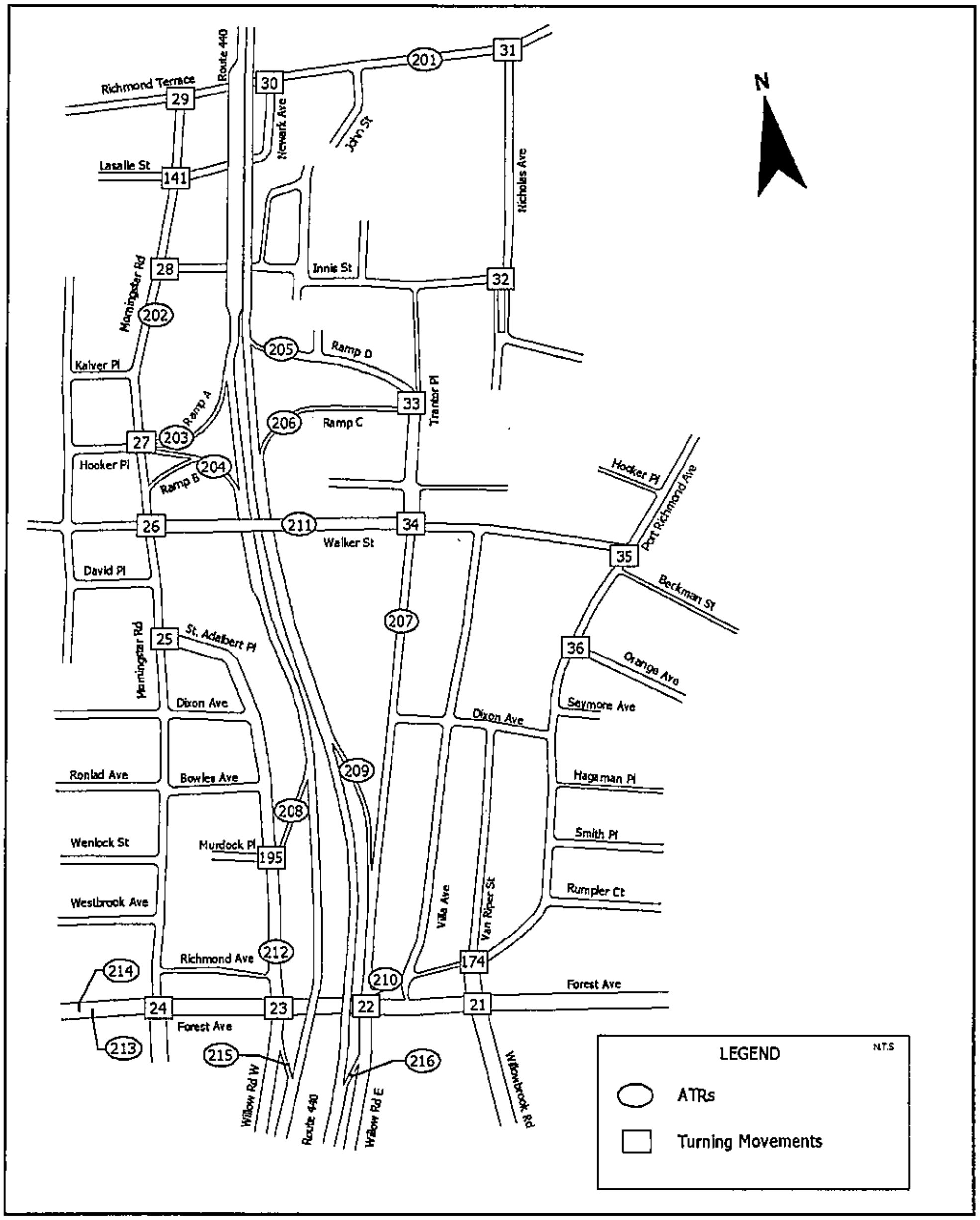


Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and **3.4** show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

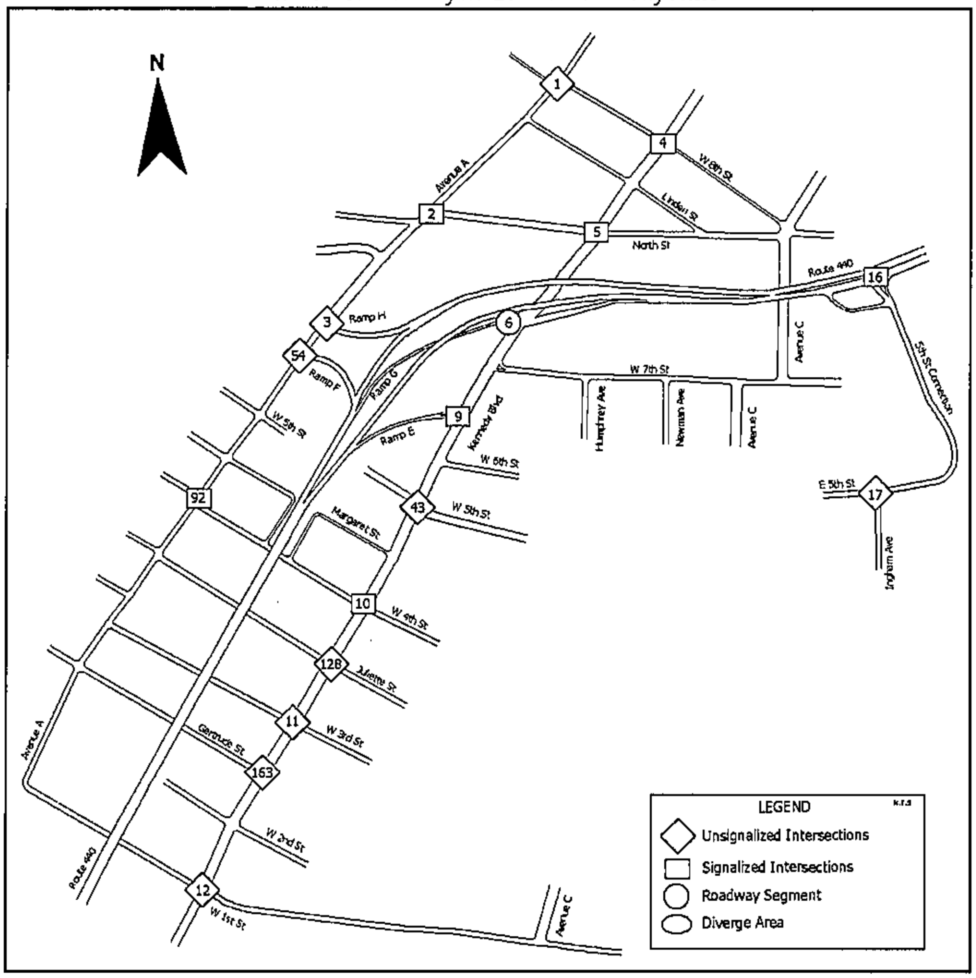
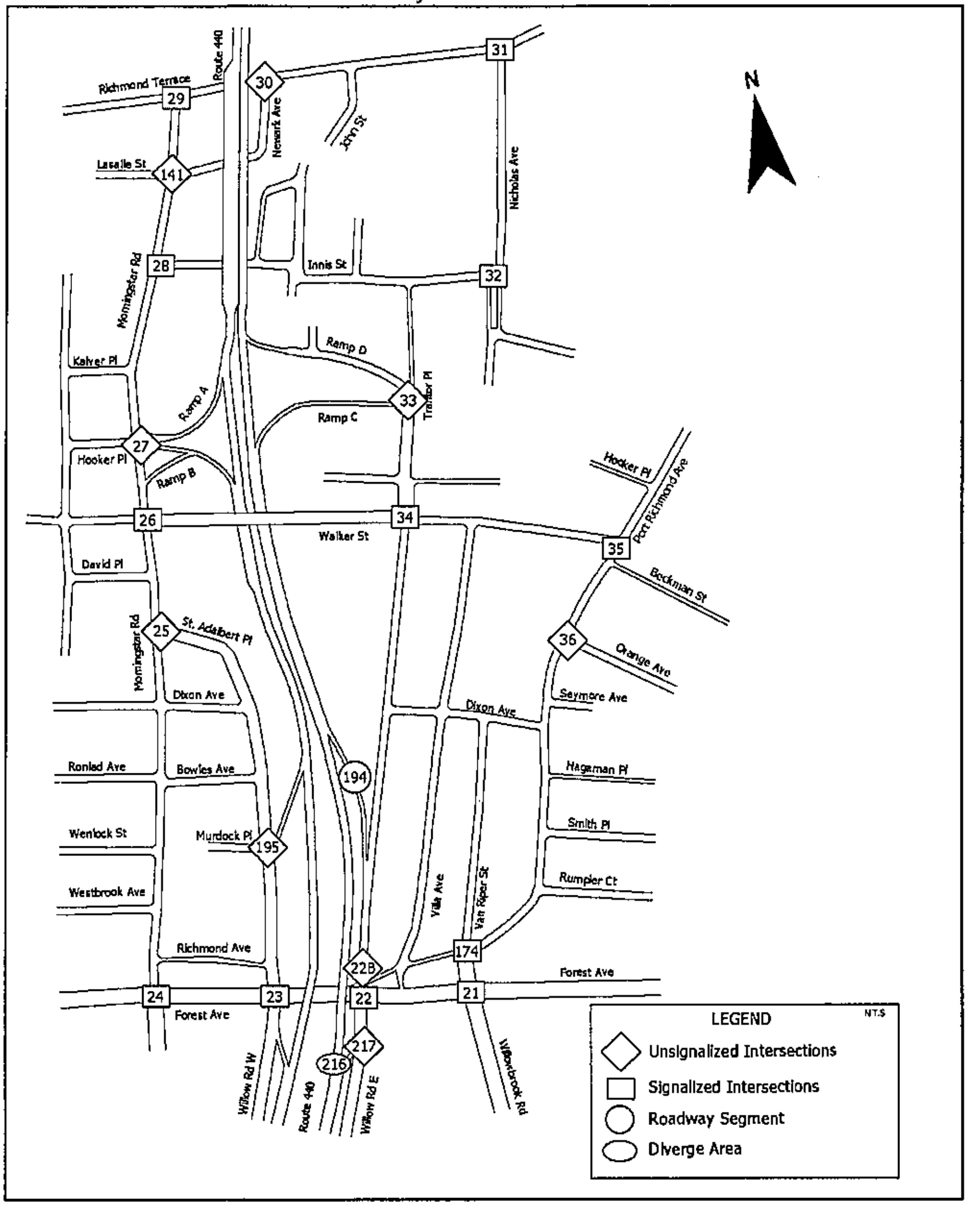


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

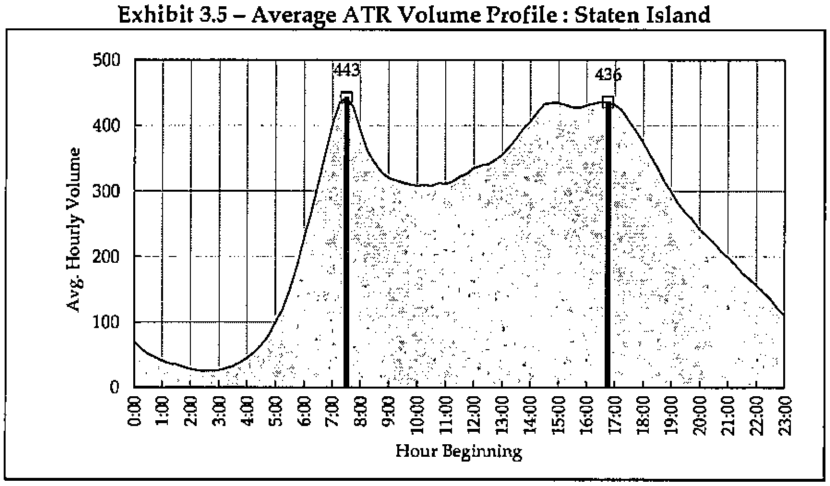
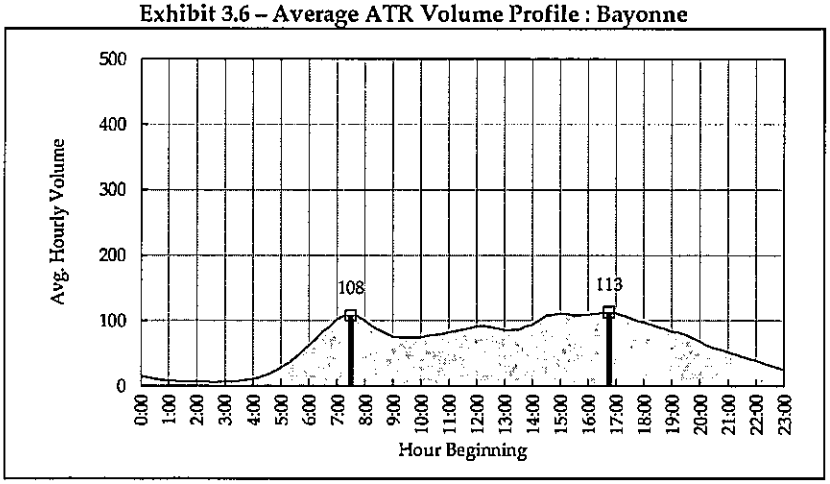


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit 3.7**, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1**. The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Origin \ Destination	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4.**

Exhibit 4.3 – Regional Zones

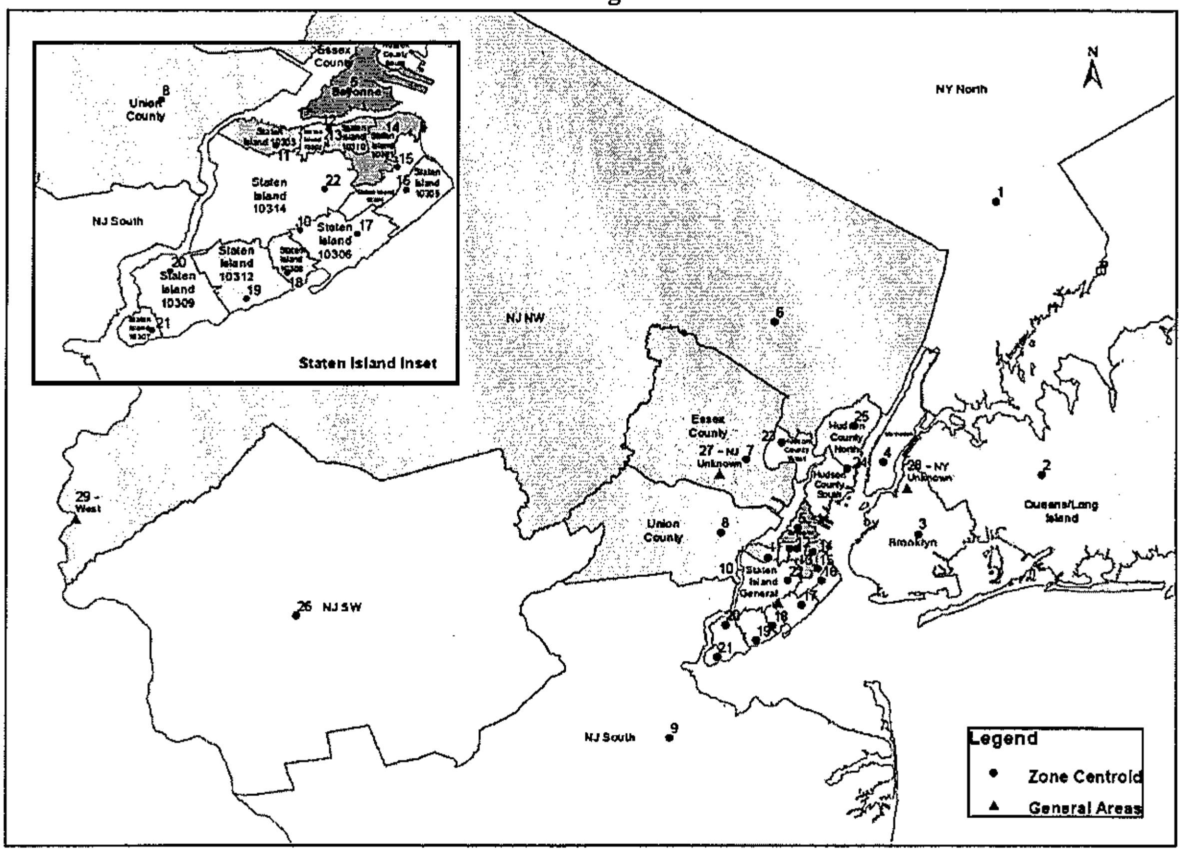


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazanc	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazanc	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
	9	J.F. Kennedy Boulevard and Ramp E					-	-				
	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
	16	Route 440 and 5th Street Connection					-	-				
	17	Ingham Avenue and E. 5th Street					-	-				
	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
	23	Forest Avenue and Willow Road West							-	-	-	-
	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
	25	Morningstar Road and St. Adalbert Place							-	-	-	-
	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
	28	Morningstar Road and Innis Street			-	-	-	-				
	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
	30	Richmond Terrace & Newark Avenue			-	-	-	-				
	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
	32	Nicholas Avenue and Innis Street			✓	-	-	-				
	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
	34	Trantor Place and Walker Street			✓	✓	✓	✓				
	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
	141	Morningstar Road and Newark Avenue			✓	-	-	-				
	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
	195	Route 440 SB ramp to Willow Road West							-	-	-	-
	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓ *Significant Impact*

\- *Location was analyzed, and no traffic impact was identified.*

(blank) *Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1**.

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10**. These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall Percentage
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1**. This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21.**

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22**. These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21.** This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

PANYNJ

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

---

From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule

- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport

- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
===

The **Manual of** Transportation **Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, **a study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION

Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications

Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation

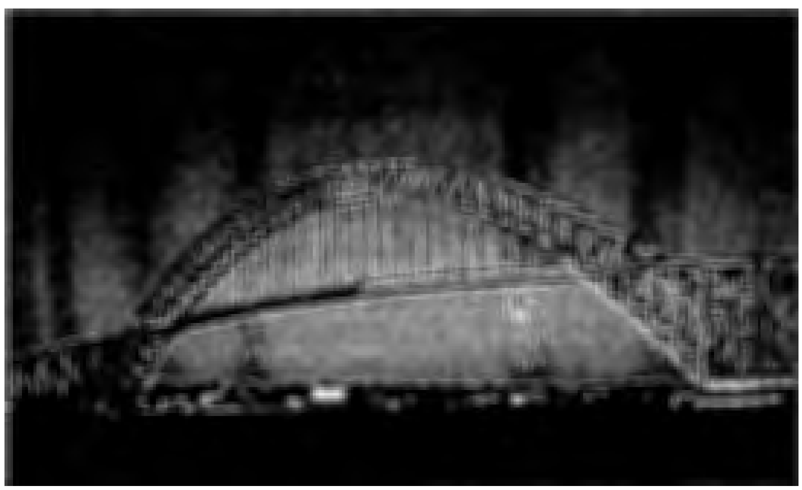
Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ



Prepared By:

VHB

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

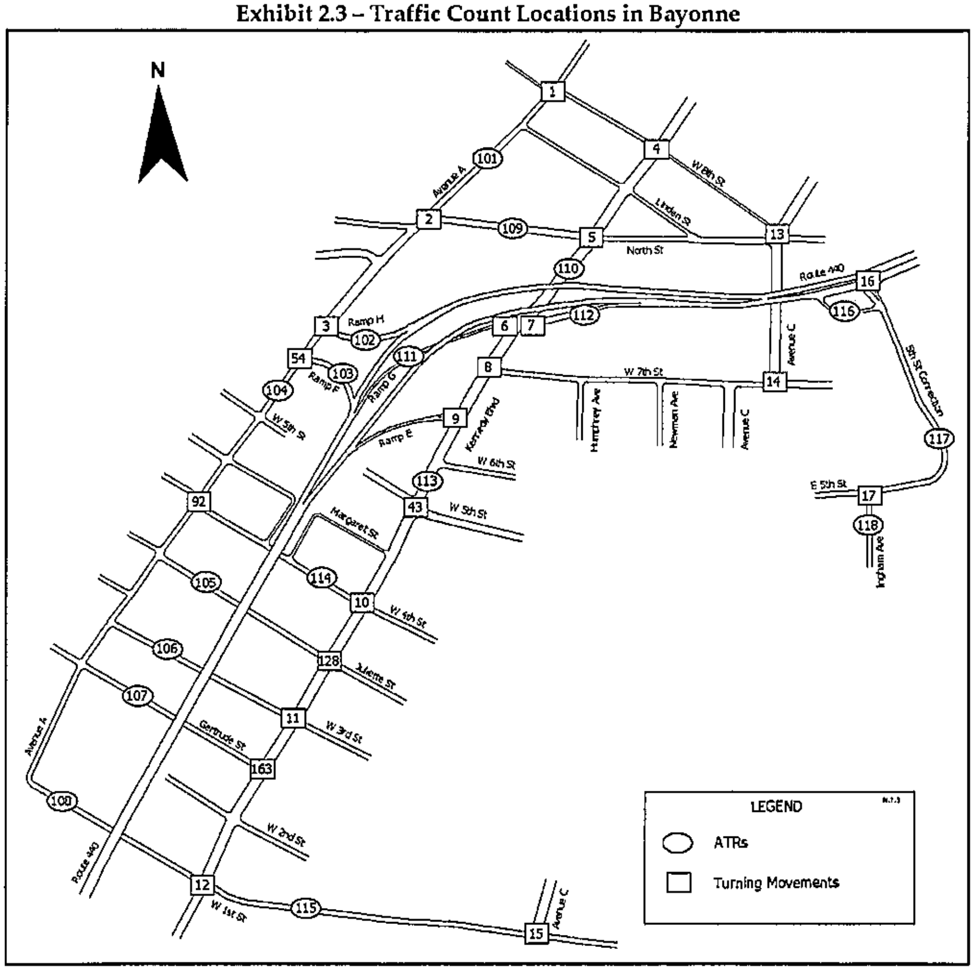


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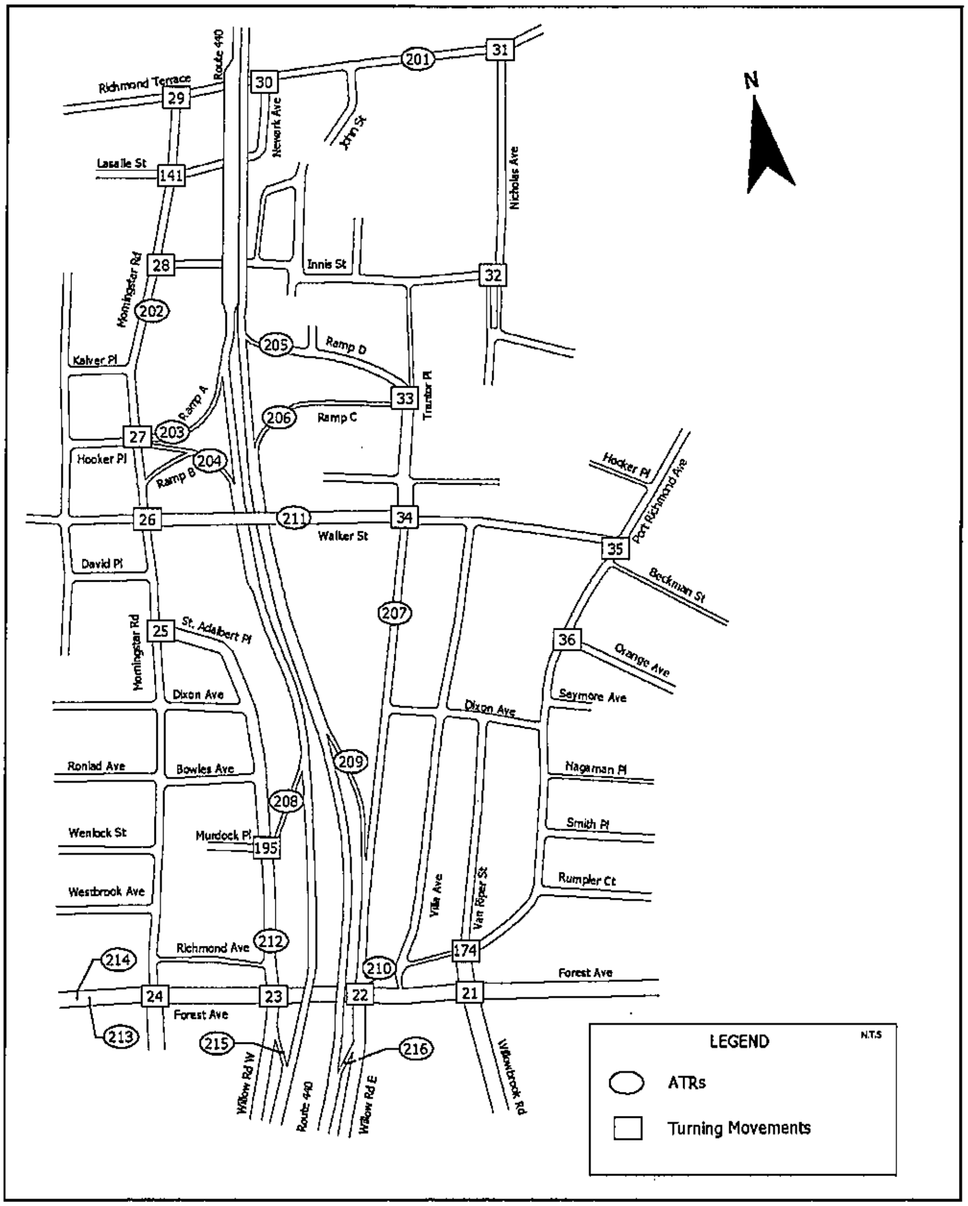
Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and **3.4** show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

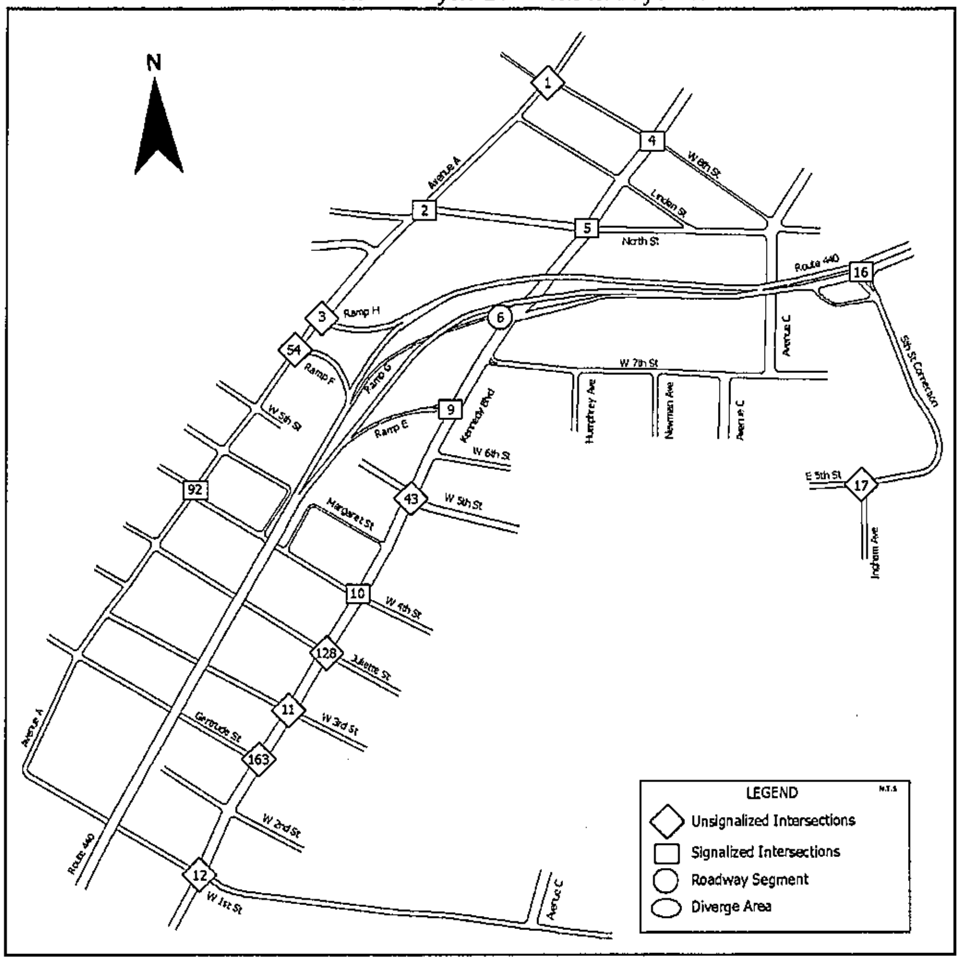


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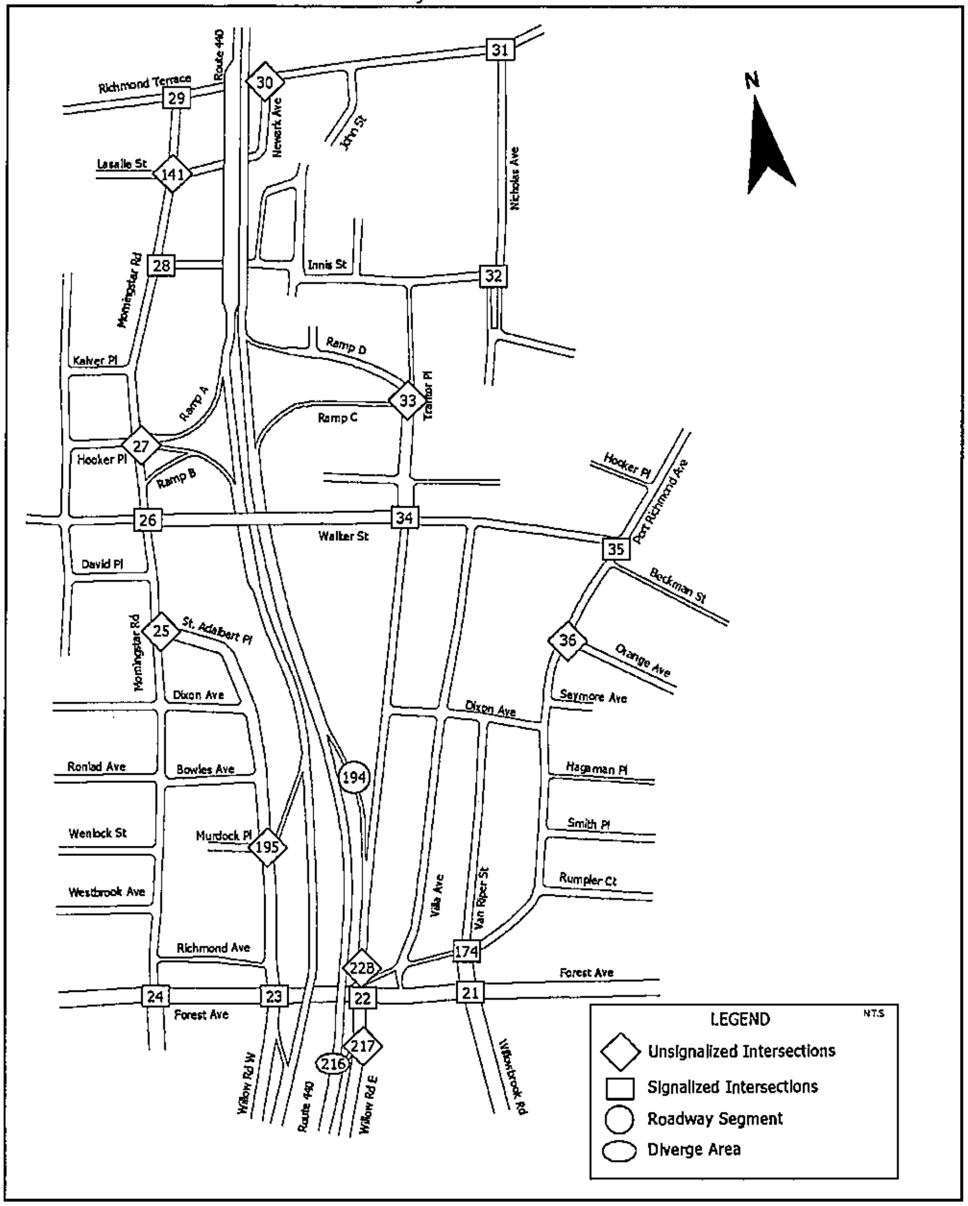
Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

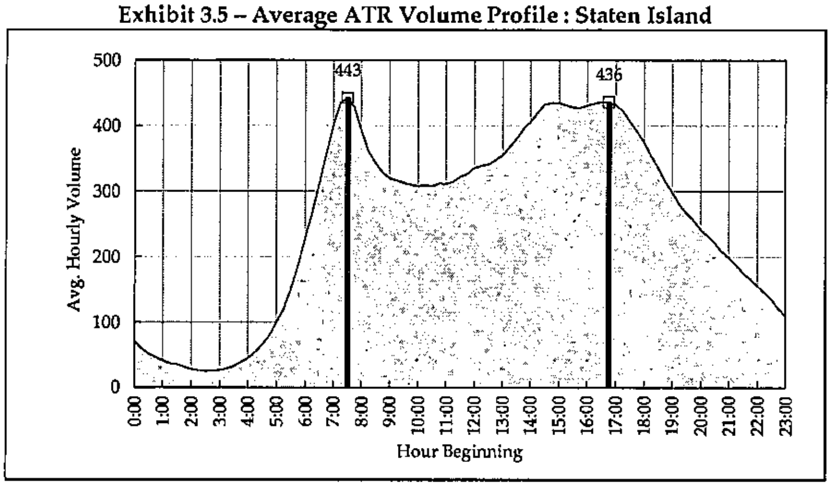
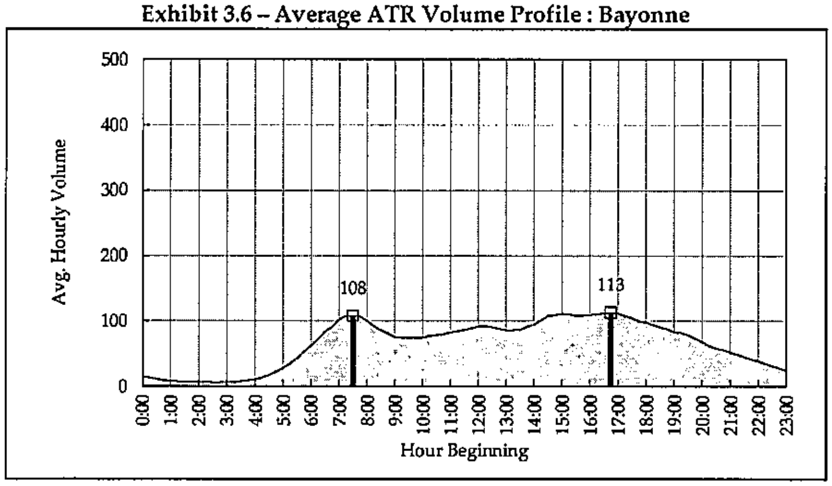


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit** 3.7, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1**. The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Destination → / Origin ↓	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

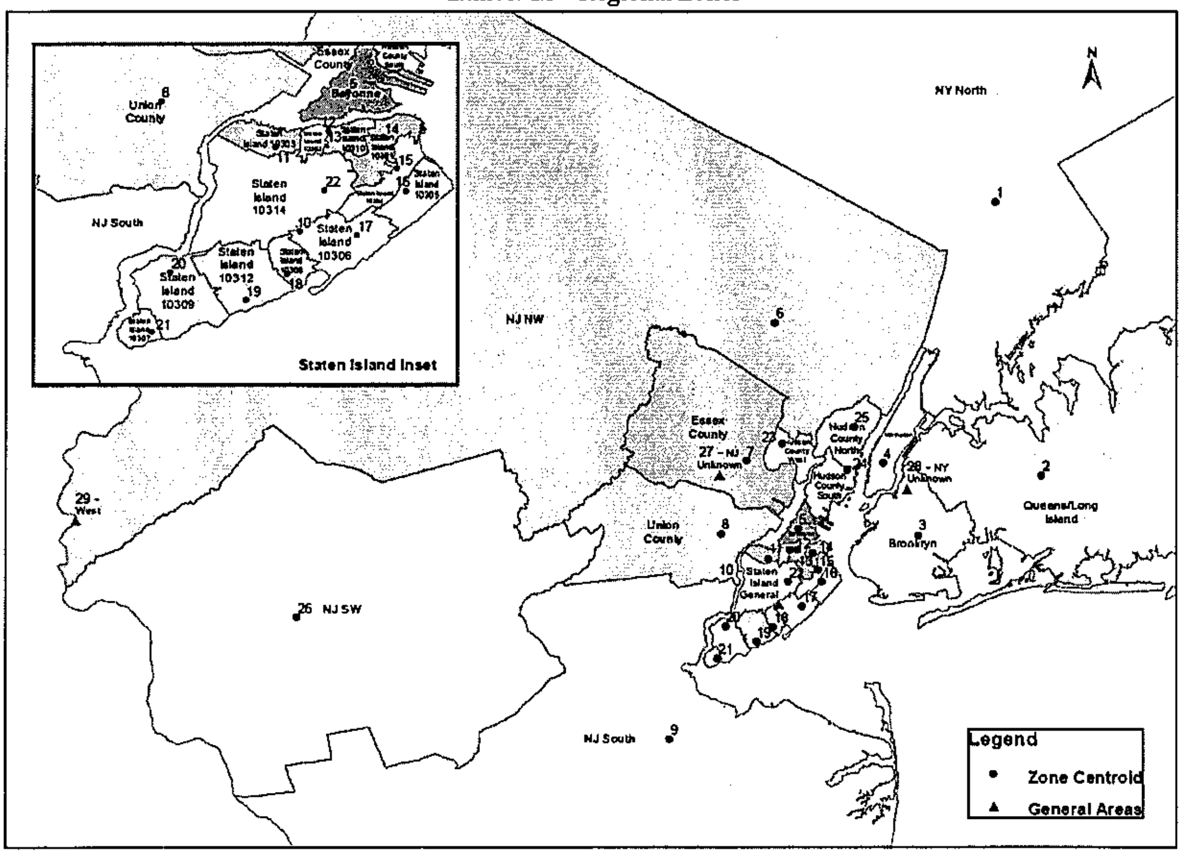


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
Bayonne	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
Bayonne	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
Bayonne	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
Bayonne	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
Bayonne	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
Bayonne	9	J.F. Kennedy Boulevard and Ramp E					-	-				
Bayonne	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bayonne	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
Bayonne	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
Bayonne	16	Route 440 and 5th Street Connection					-	-				
Bayonne	17	Ingham Avenue and E. 5th Street					-	-				
Bayonne	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
Bayonne	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
Bayonne	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
Bayonne	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
Staten Island	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
Staten Island	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
Staten Island	23	Forest Avenue and Willow Road West							-	-	-	-
Staten Island	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
Staten Island	25	Morningstar Road and St. Adalbert Place							-	-	-	-
Staten Island	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
Staten Island	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
Staten Island	28	Morningstar Road and Innis Street			-	-	-	-				
Staten Island	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
Staten Island	30	Richmond Terrace & Newark Avenue			-	-	-	-				
Staten Island	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
Staten Island	32	Nicholas Avenue and Innis Street			✓	-	-	-				
Staten Island	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
Staten Island	34	Trantor Place and Walker Street			✓	✓	✓	✓				
Staten Island	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
Staten Island	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
Staten Island	141	Morningstar Road and Newark Avenue			✓	-	-	-				
Staten Island	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
Staten Island	195	Route 440 SB ramp to Willow Road West							-	-	-	-
Staten Island	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
Staten Island	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓	*Significant Impact*
-	*Location was analyzed, and no traffic impact was identified.*
(blank)	*Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit** 4.1.

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10**. These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	Percentage
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1**. This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and 5.19 show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22.** These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21.** This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

Hour Beg.	New York Bound							New Jersey Bound						
	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?
		Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service				Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service		
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

PANYNJ

From:	MacSpadden, Lisa
Sent:	Friday, December 06, 2013 10:40 AM
To:	Valens, Chris
Subject:	FW: needed info
Attachments:	BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
===

The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, **a study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies:**

1.0 INTRODUCTION
Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications
Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation

Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ

Prepared By:

VHB

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

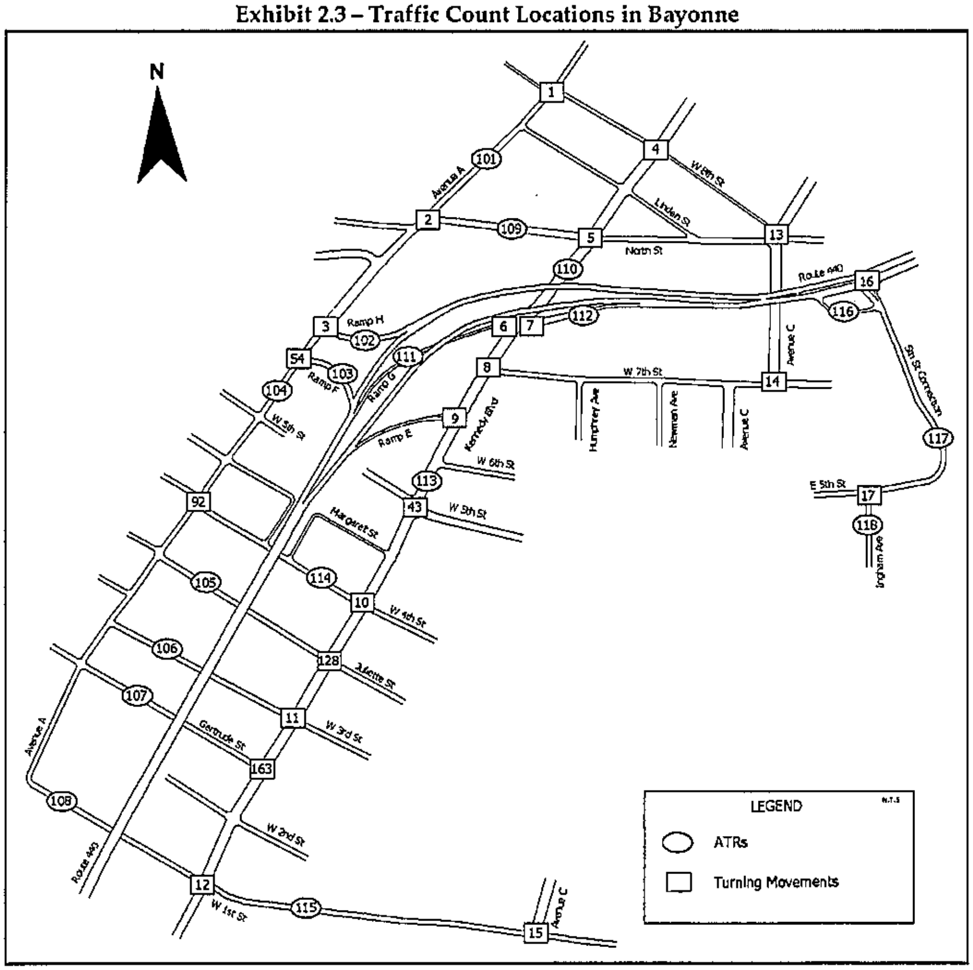
Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

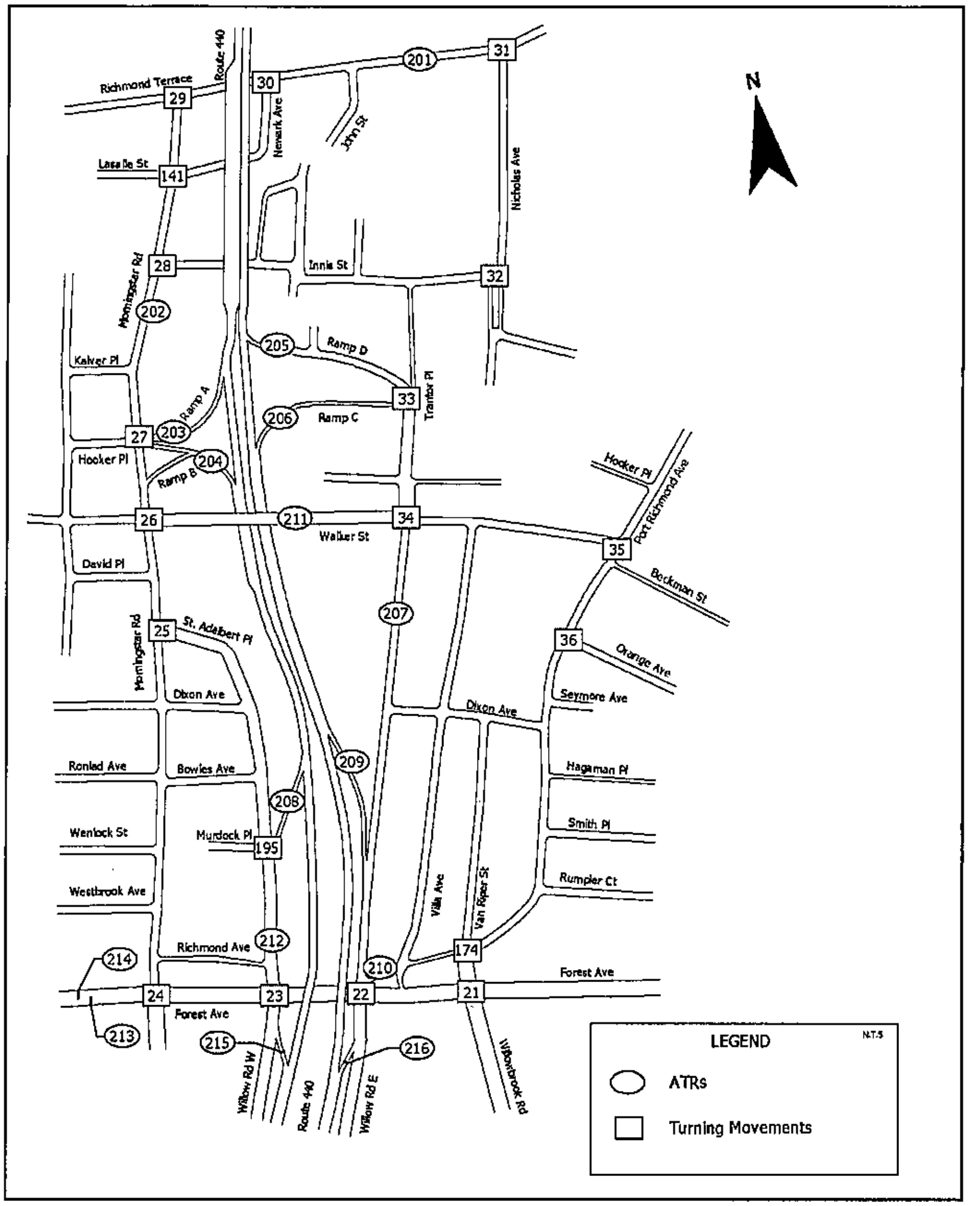
Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne



PA - TRAFF - 0006841

Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8^{th} Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8^{th} Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4^{th} Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3^{rd} Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1^{st} Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5^{th} Street Connection			✓		
	17	U	Ingham Avenue and E. 5^{th} Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5^{th} Street			✓		
	92	S	Avenue A and W. 4^{th} Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and **3.4** show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

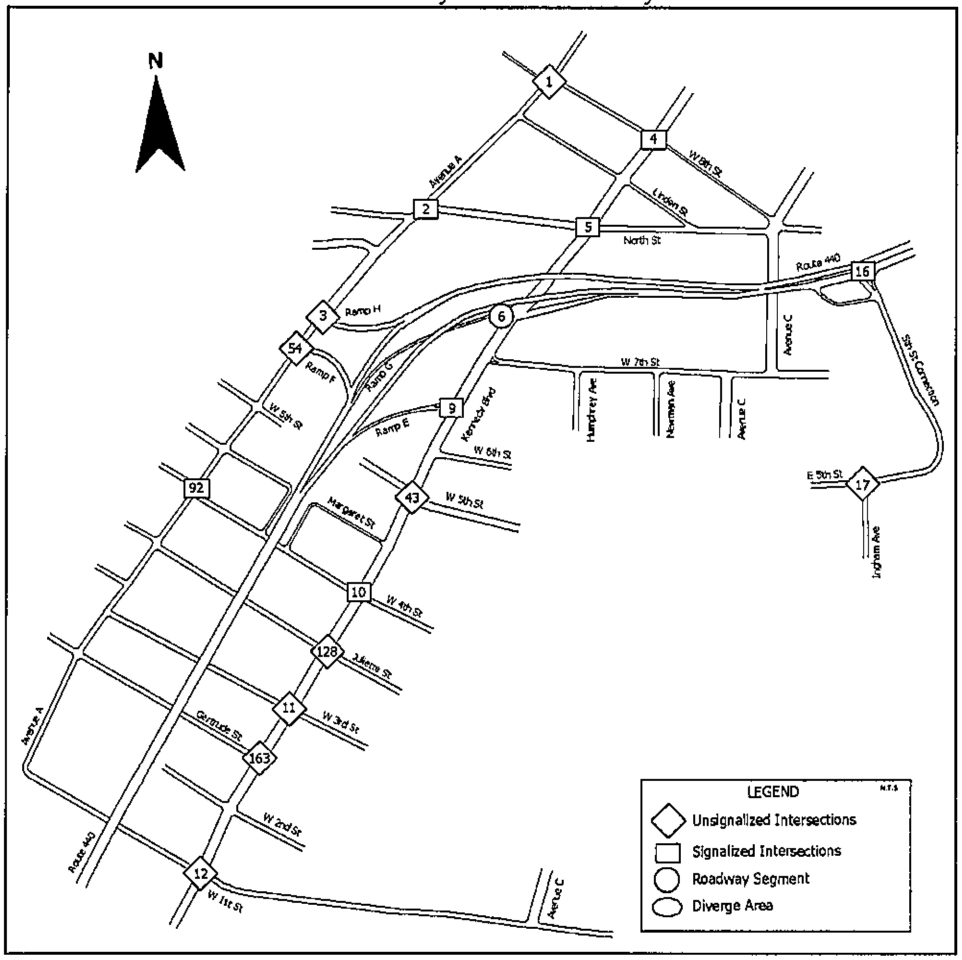
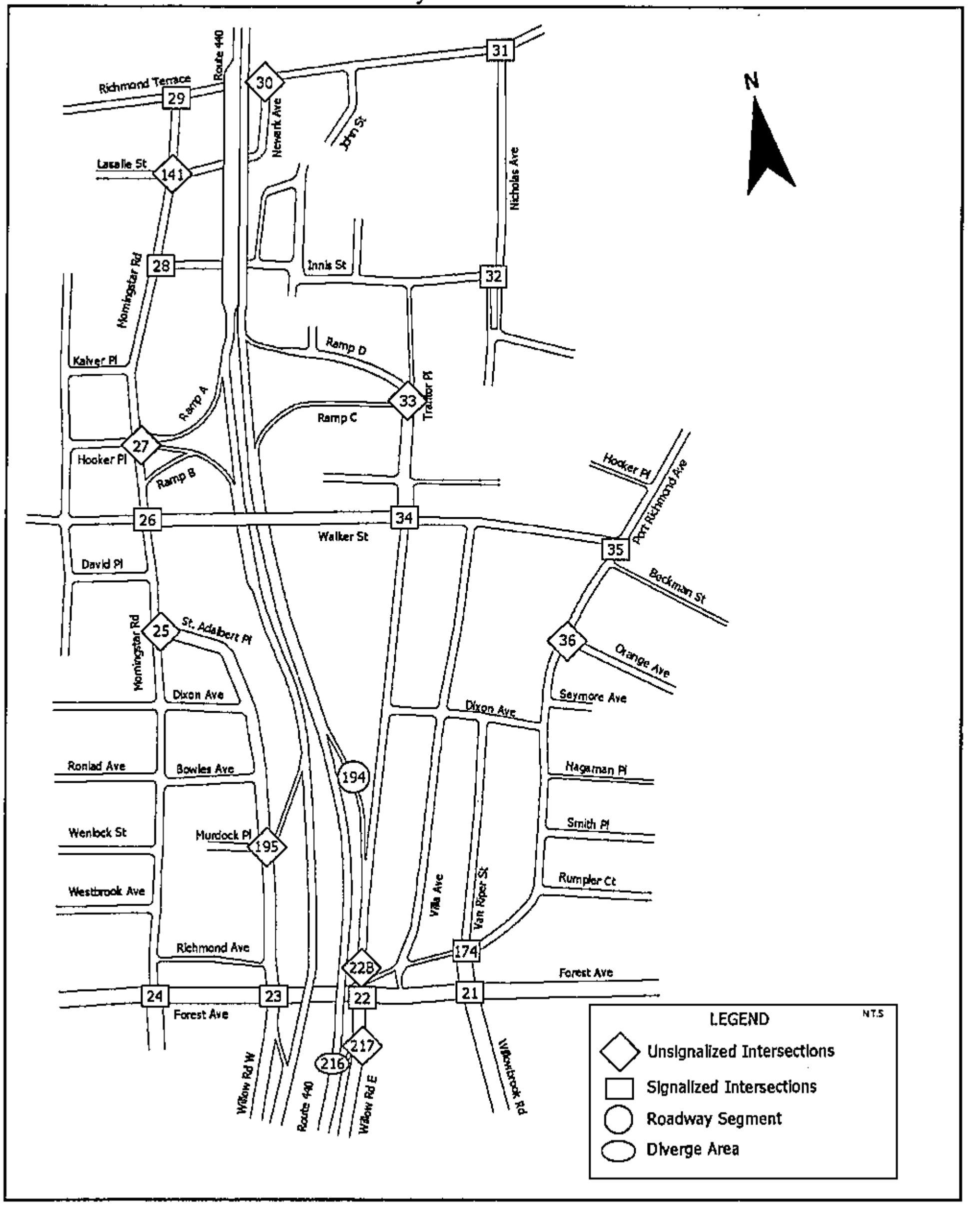


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

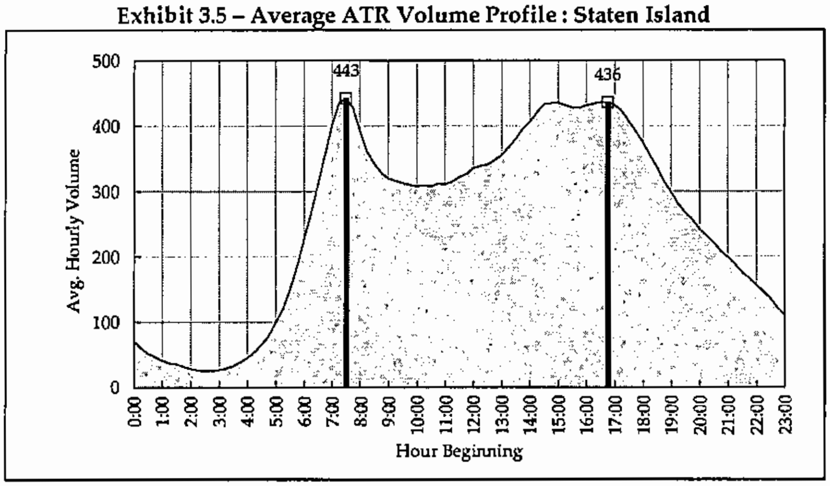
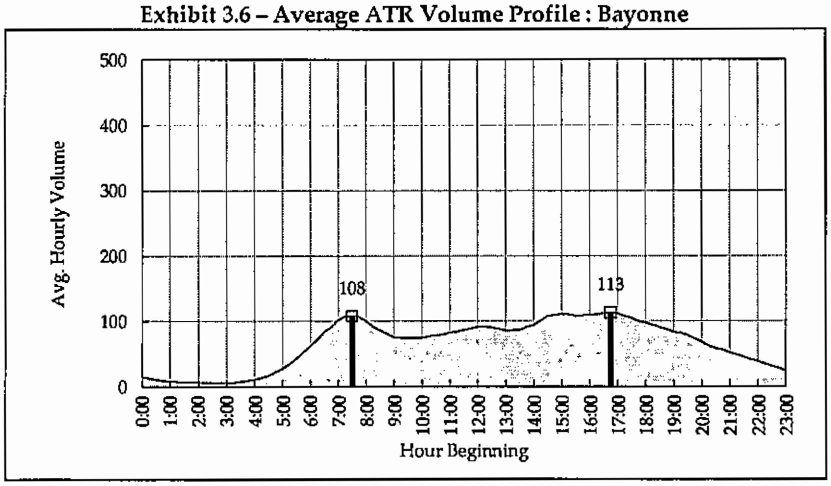


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit** 3.7, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1.** The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Destination → / Origin ↓	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

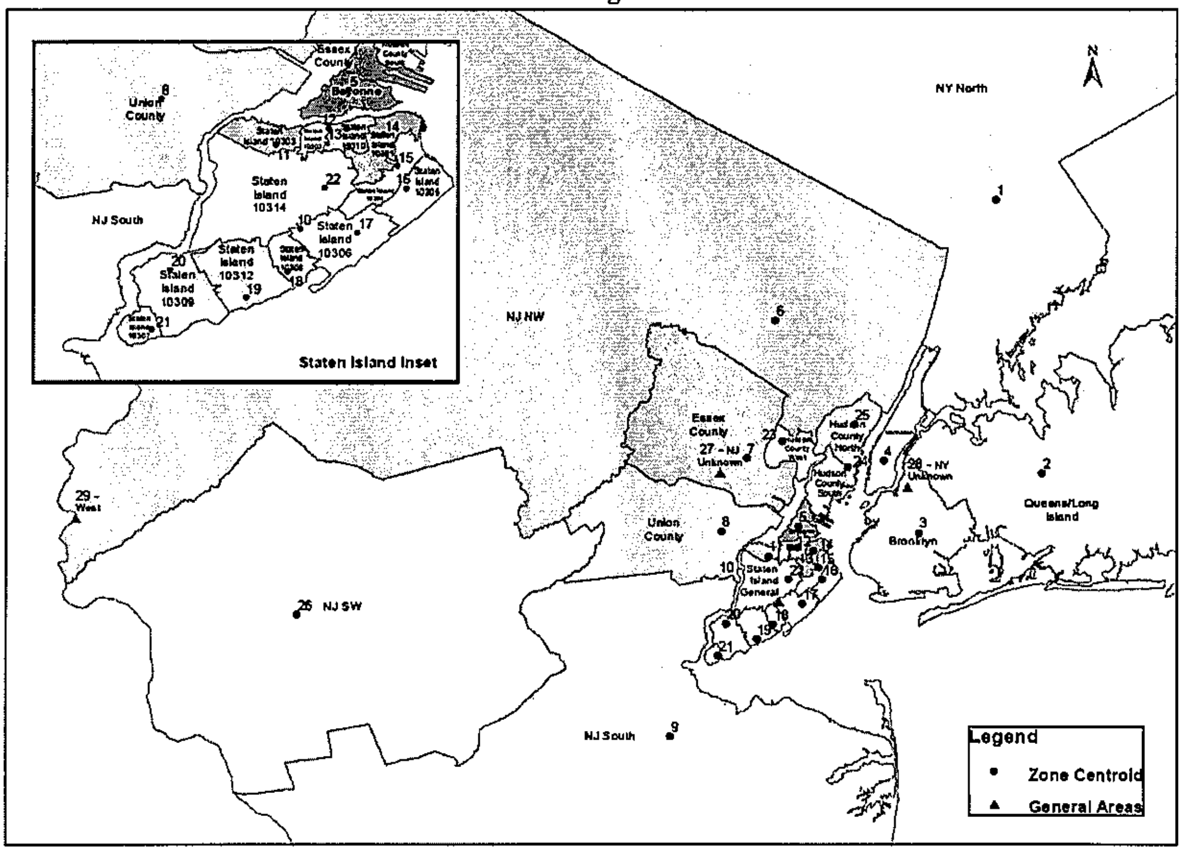


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
Bayonne	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
Bayonne	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
Bayonne	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
Bayonne	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
Bayonne	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
Bayonne	9	J.F. Kennedy Boulevard and Ramp E					-	-				
Bayonne	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bayonne	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
Bayonne	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
Bayonne	16	Route 440 and 5th Street Connection					-	-				
Bayonne	17	Ingham Avenue and E. 5th Street					-	-				
Bayonne	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
Bayonne	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
Bayonne	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
Bayonne	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
Staten Island	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
Staten Island	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
Staten Island	23	Forest Avenue and Willow Road West							-	-	-	-
Staten Island	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
Staten Island	25	Morningstar Road and St. Adalbert Place							-	-	-	-
Staten Island	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
Staten Island	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
Staten Island	28	Morningstar Road and Innis Street			-	-	-	-				
Staten Island	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
Staten Island	30	Richmond Terrace & Newark Avenue			-	-	-	-				
Staten Island	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
Staten Island	32	Nicholas Avenue and Innis Street			✓	-	-	-				
Staten Island	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
Staten Island	34	Trantor Place and Walker Street			✓	✓	✓	✓				
Staten Island	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
Staten Island	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
Staten Island	141	Morningstar Road and Newark Avenue			✓	-	-	-				
Staten Island	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
Staten Island	195	Route 440 SB ramp to Willow Road West							-	-	-	-
Staten Island	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
Staten Island	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓	*Significant Impact*
-	*Location was analyzed, and no traffic impact was identified.*
(empty box)	*Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1.**

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10.** These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall Percentage
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1.** This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts - Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21.**

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22.** These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit** 5.22 do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit** 5.21. This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report -** summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
==

The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, a **study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION
Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications
Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation

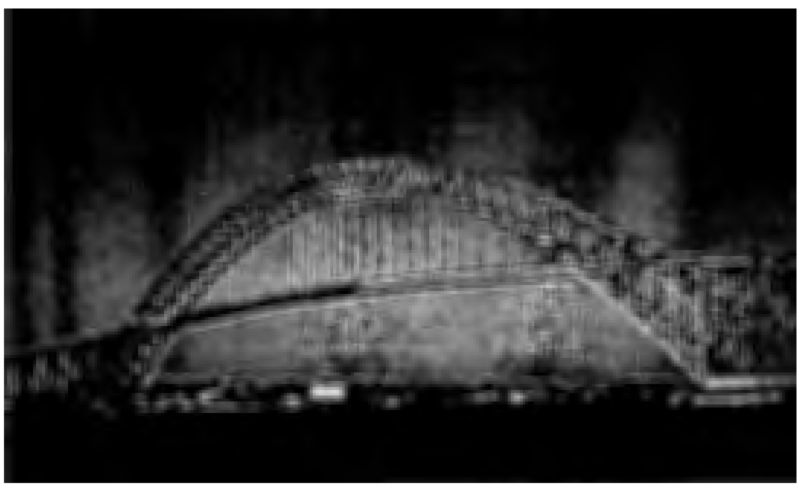
Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ



Prepared By:

VHB

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5^{th} Street
	105	Juliette Street, East of Avenue A
	106	W. 3^{rd} Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1^{st} Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5^{th} Street
	114	W. 4^{th} Street, West of J.F. Kennedy Boulevard
	115	W. 1^{st} Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5^{th} Street Connector Jughandle
	117	5^{th} Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5^{th} Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

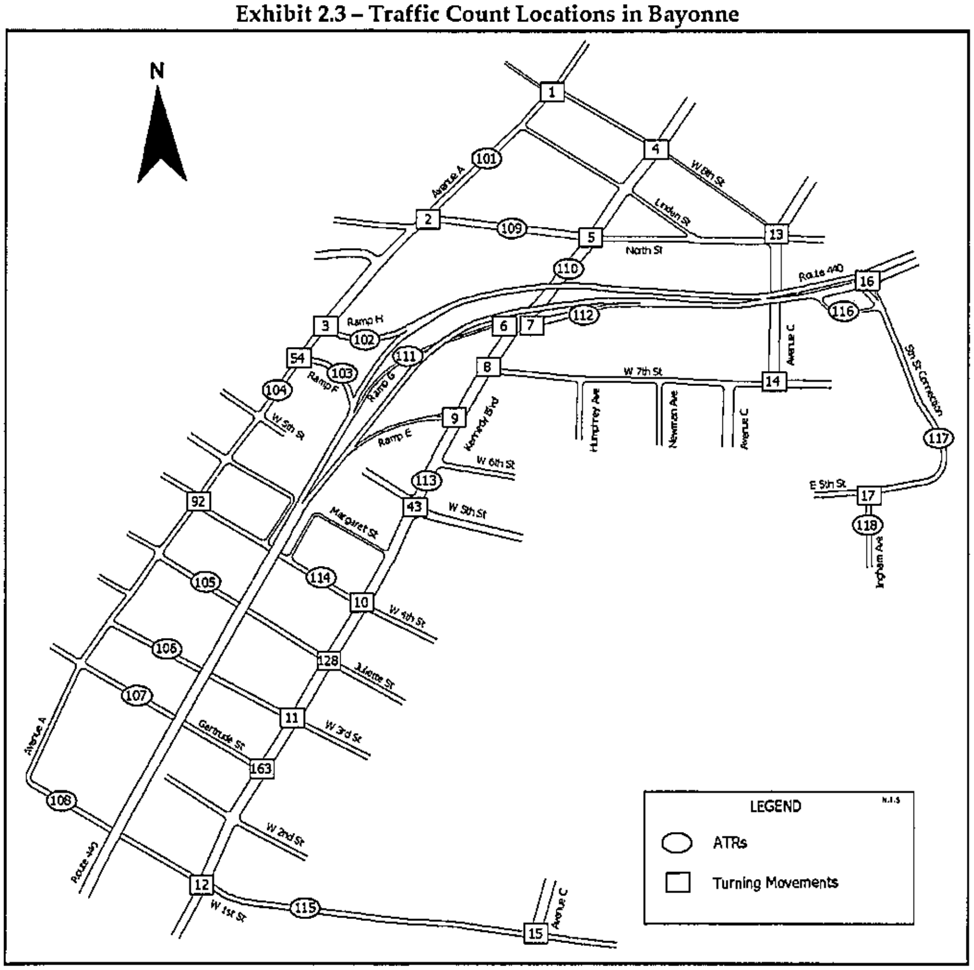
Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

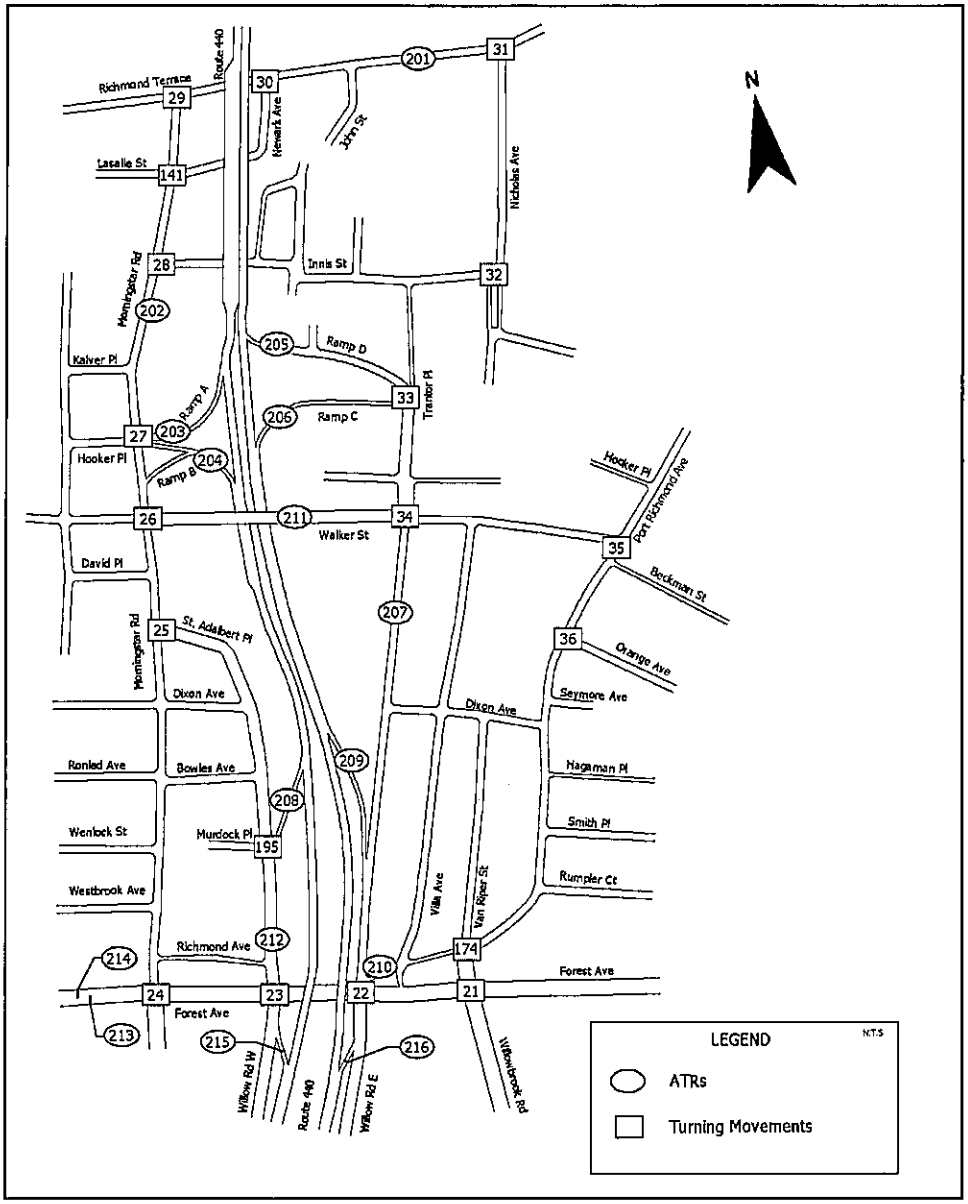
Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne



PA - TRAFF - 0006894

Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

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Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and 3.4 show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

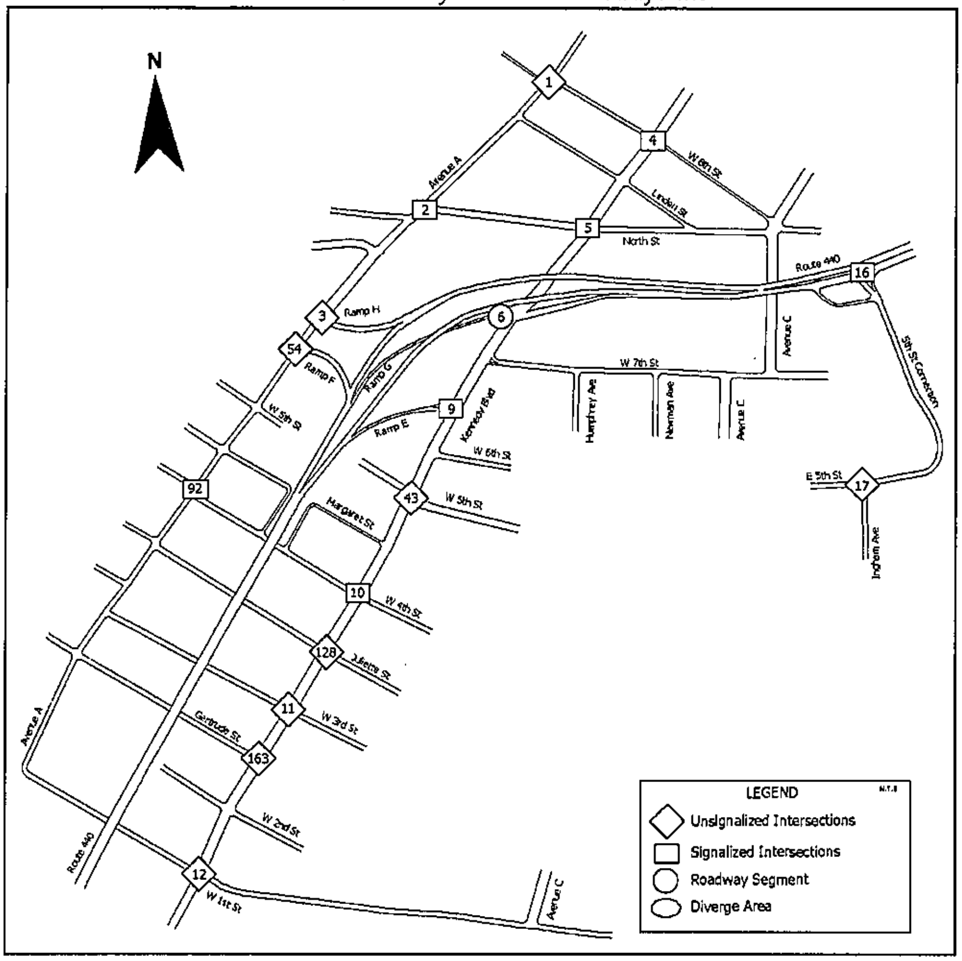
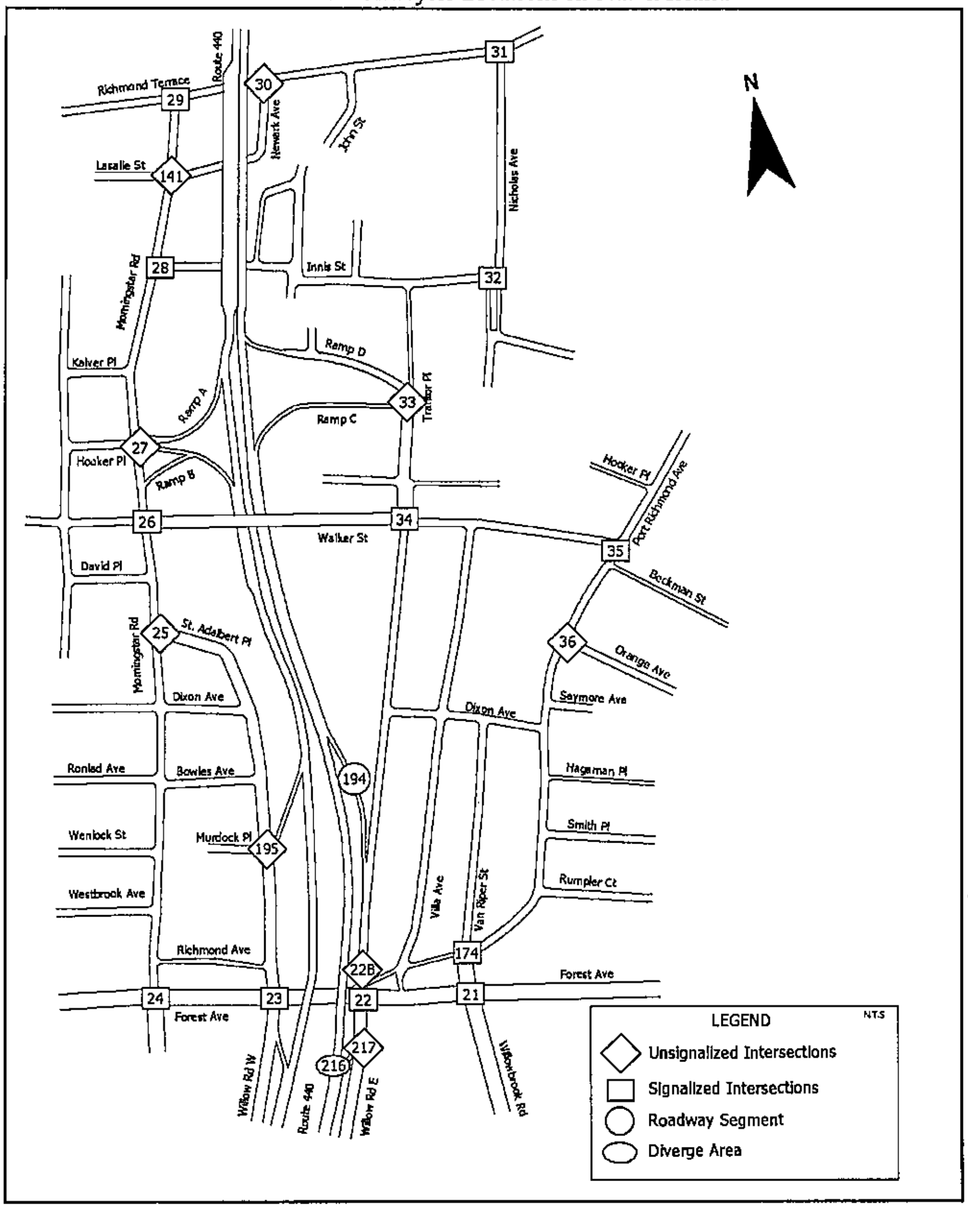


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

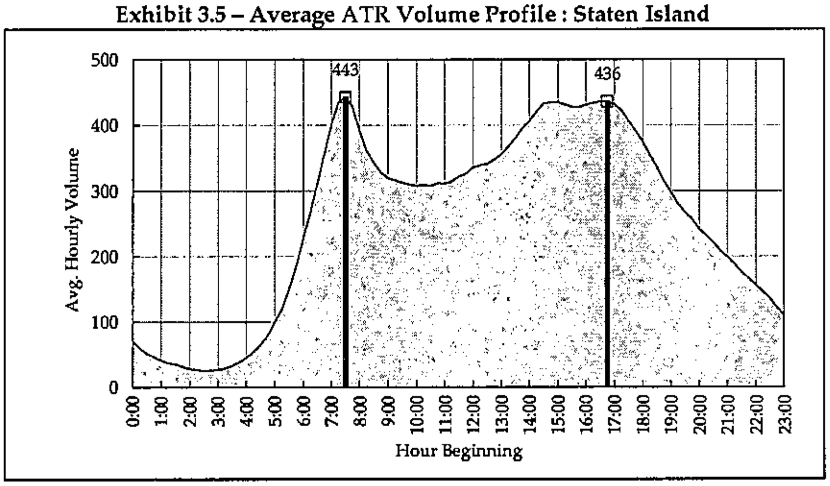
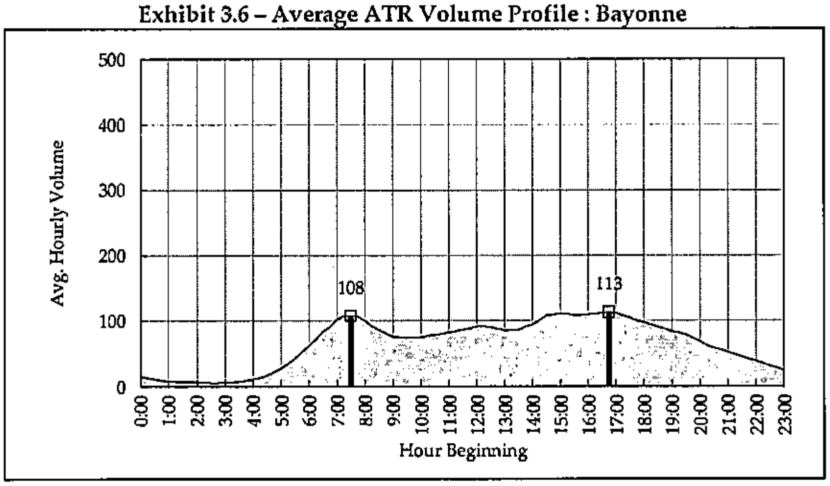


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit** 3.7, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1**. The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Origin \ Destination	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

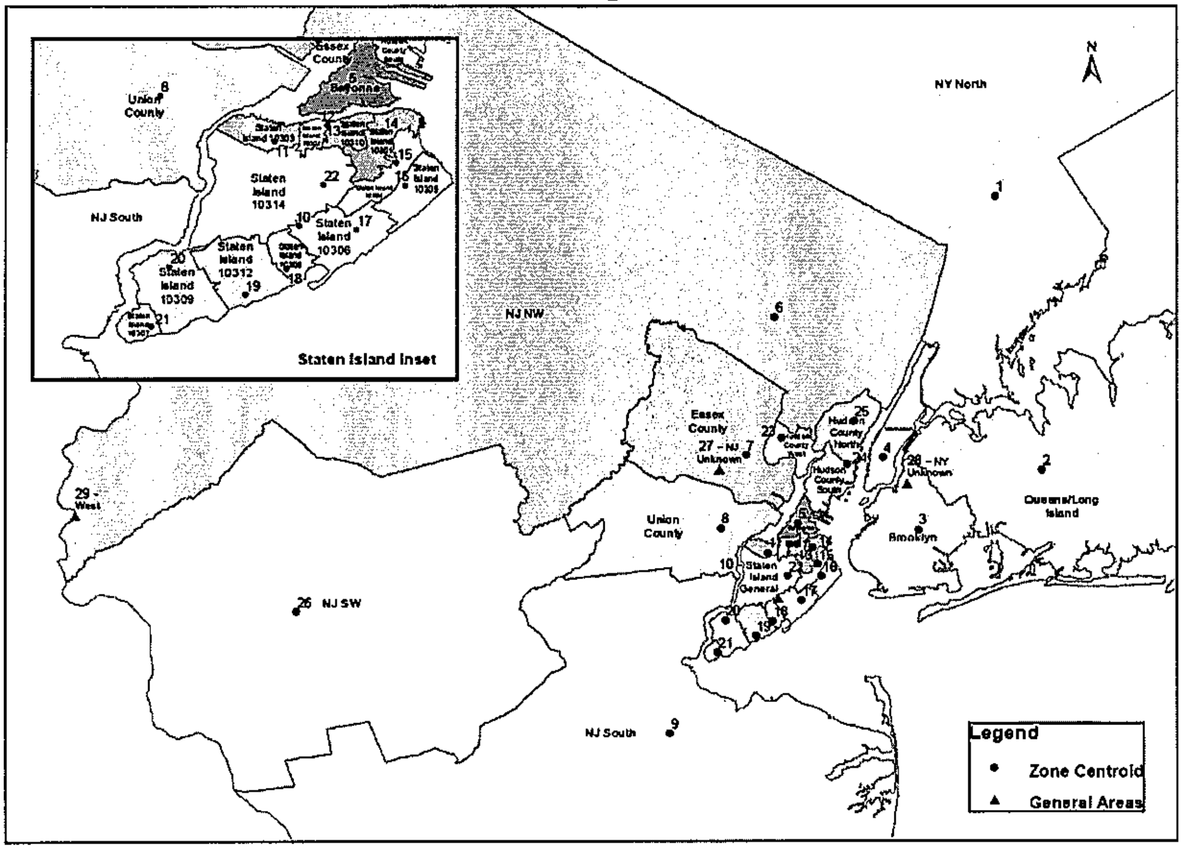


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000*.

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
	9	J.F. Kennedy Boulevard and Ramp E					-	-				
	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
	16	Route 440 and 5th Street Connection					-	-				
	17	Ingham Avenue and E. 5th Street					-	-				
	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
	23	Forest Avenue and Willow Road West							-	-	-	-
	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
	25	Morningstar Road and St. Adalbert Place							-	-	-	-
	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
	28	Morningstar Road and Innis Street			-	-	-	-				
	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
	30	Richmond Terrace & Newark Avenue			-	-	-	-				
	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
	32	Nicholas Avenue and Innis Street			✓	-	-	-				
	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
	34	Trantor Place and Walker Street			✓	✓	✓	✓				
	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
	141	Morningstar Road and Newark Avenue			✓	-	-	-				
	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
	195	Route 440 SB ramp to Willow Road West							-	-	-	-
	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓ *Significant Impact*

\- *Location was analyzed, and no traffic impact was identified.*

[ ] *Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit** 4.1.

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit** 5.10. These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall Percentage
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1**. This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and 5.13 show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and 5.17 show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22.** These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel <u>and</u> the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21.** This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

Hour Beg.	New York Bound							New Jersey Bound						
	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?
		Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service				Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service		
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

Hour Beg.	New York Bound							New Jersey Bound						
	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?
		Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service				Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service		
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

PANYNJ

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report -** summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report -** documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
==
===============

The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, a **study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION

Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications

Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

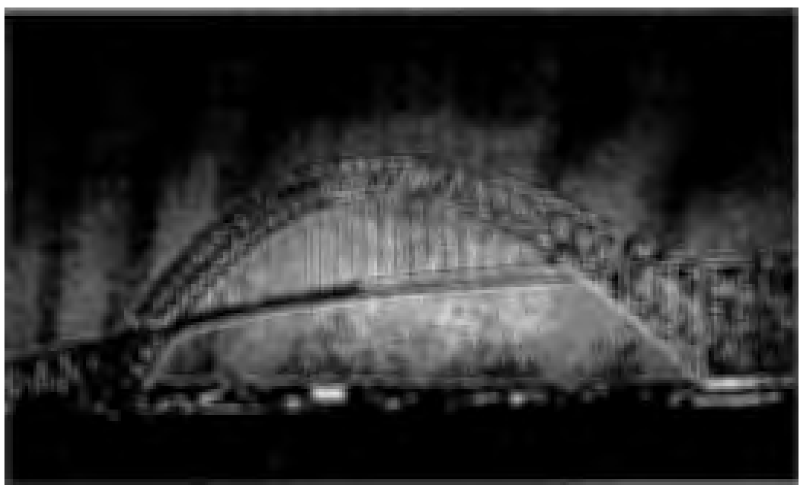
Appendix C: Transportation
Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ



Prepared By:

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

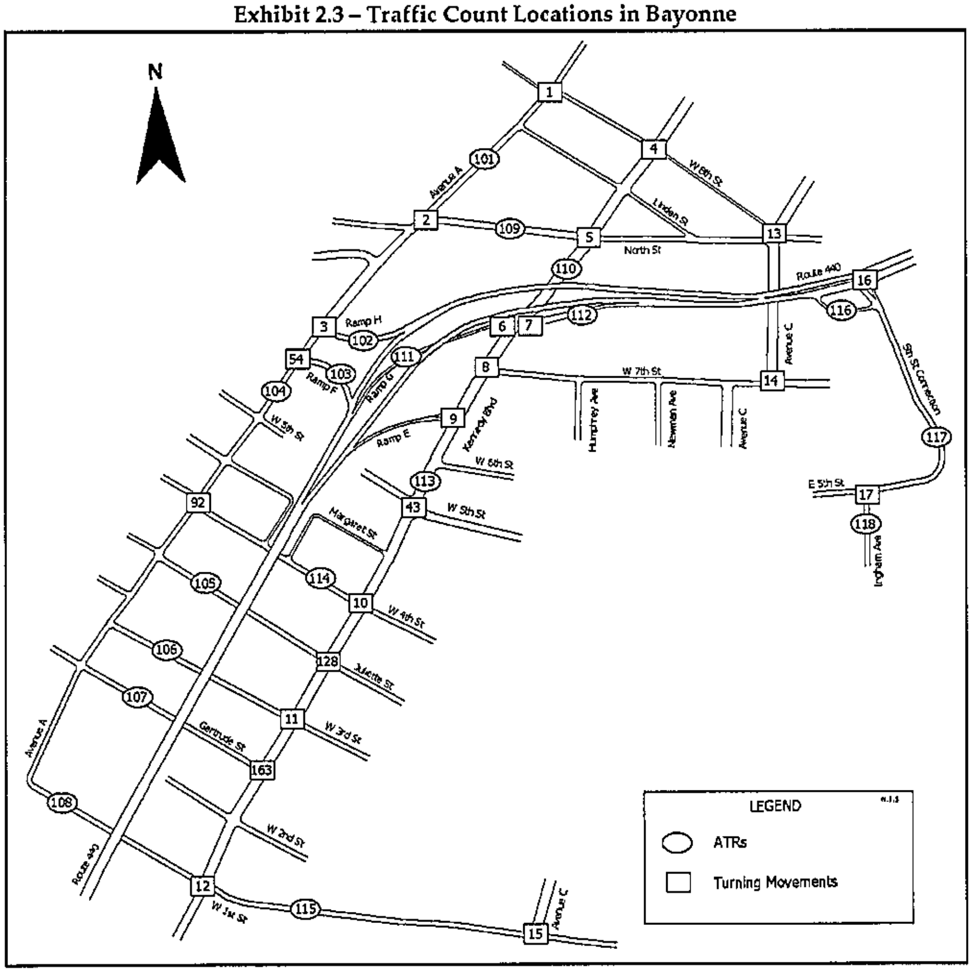
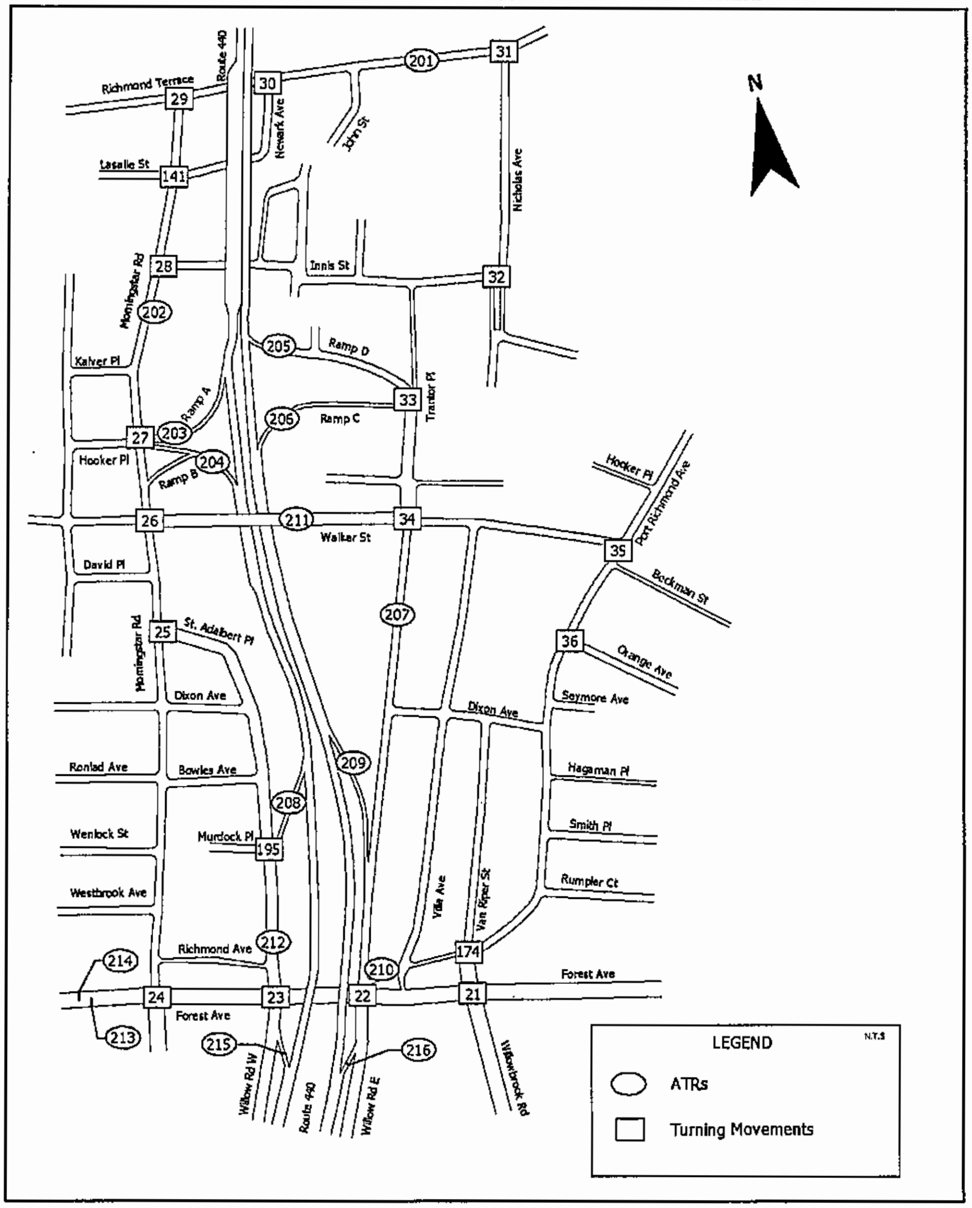


Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and 3.4 show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

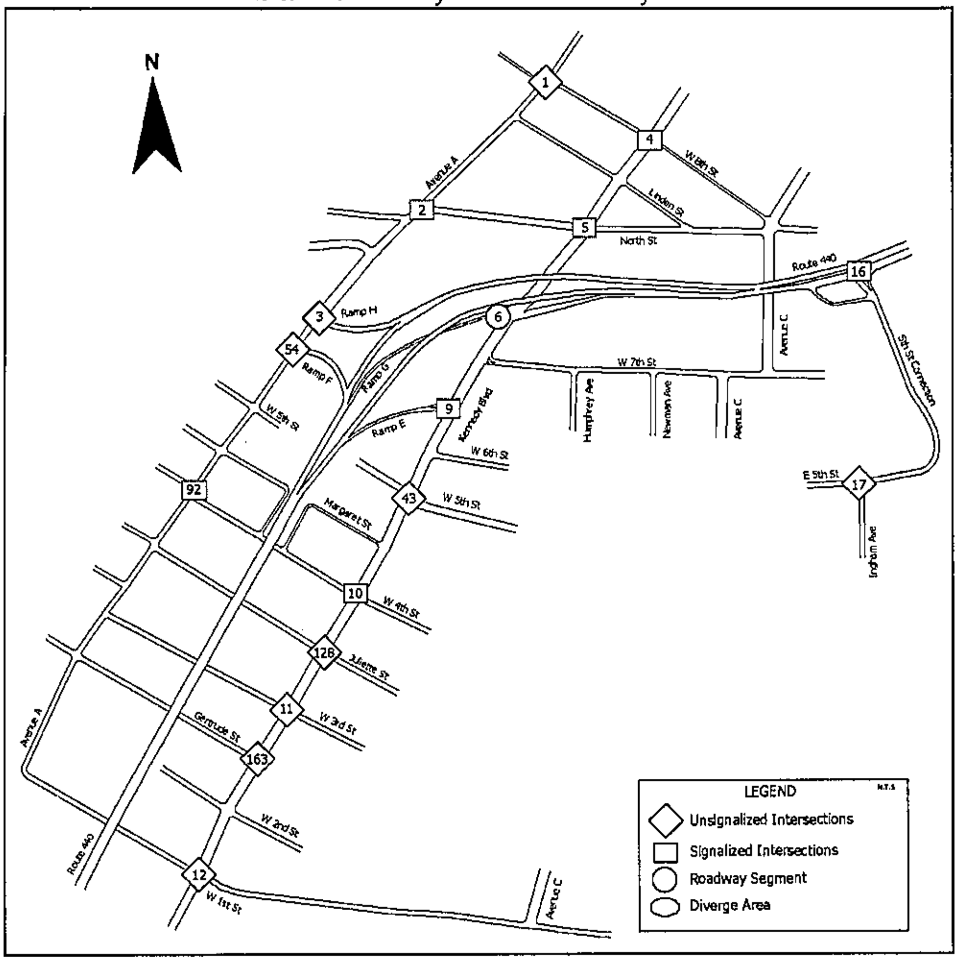
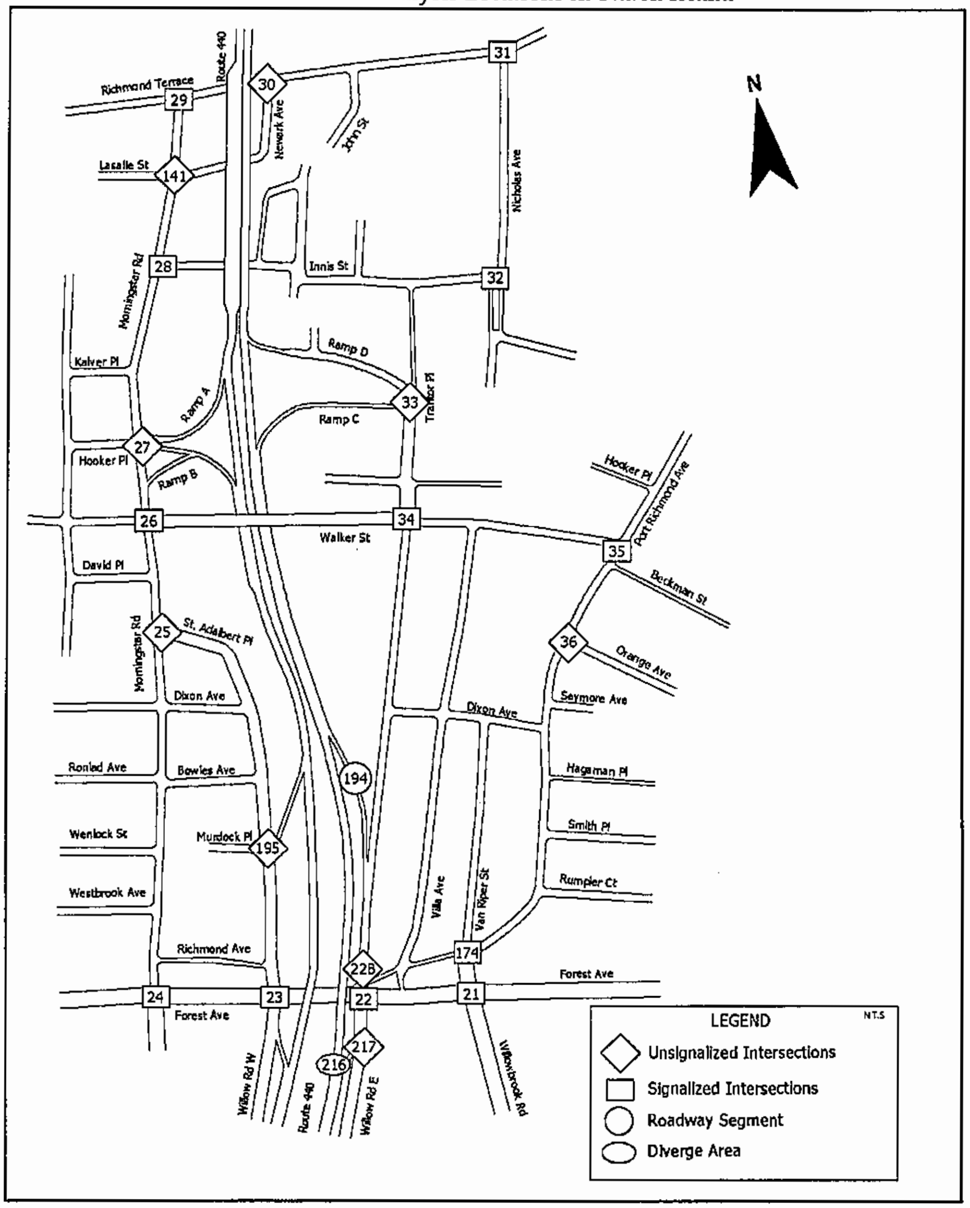


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

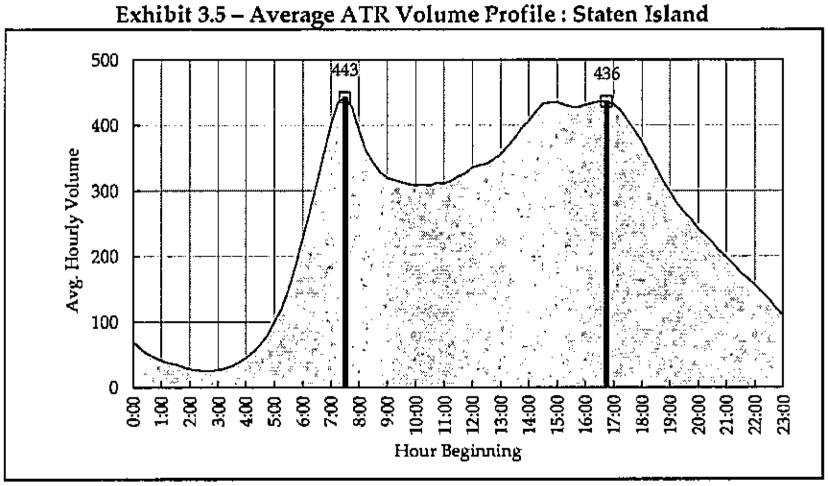
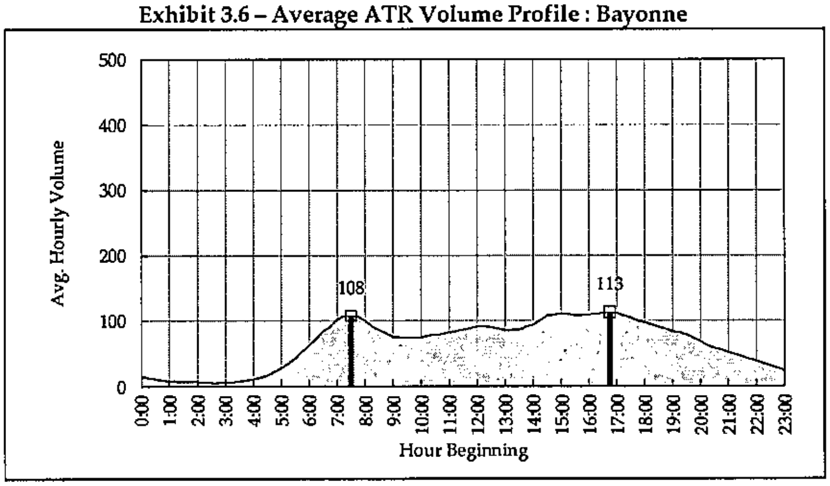


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit 3.7**, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1**. The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

	Destination / Origin	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North													0.9%							0.9%
2	Queens/Long Island												0.9%								0.9%
4	Manhattan								1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne		4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW			0.9%								0.5%						0.9%			2.4%
7	Essex County			4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County														0.9%					0.9%	1.8%
23	Hudson County West			0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South		4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North			2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW										0.9%										0.9%
27	NJ Unknown		0.9%											0.5%							1.4%
28	NY Unknown																0.9%				0.9%
Grand Total			10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

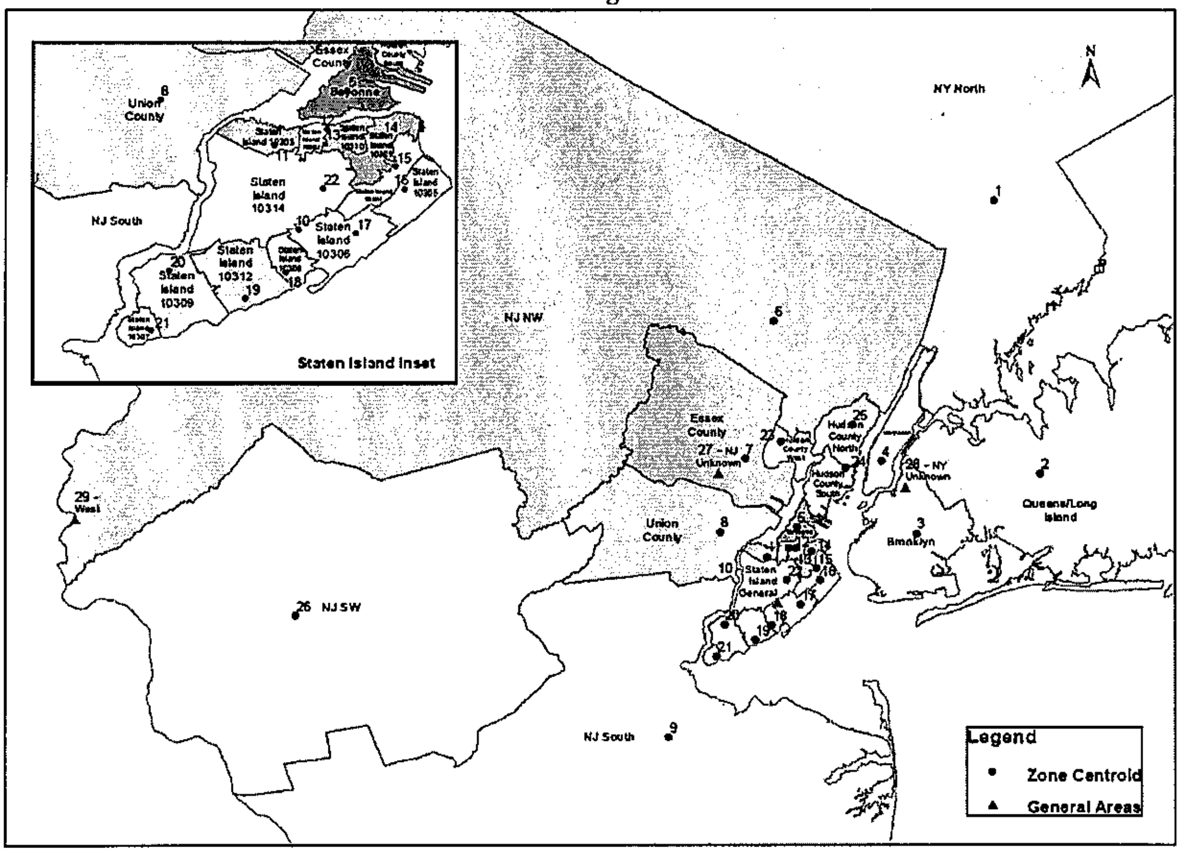


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8^{th} Street	-	-					-	-	-	-
Bayonne	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
Bayonne	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
Bayonne	4	J.F. Kennedy Boulevard and W. 8^{th} Street	-	-					-	-	-	-
Bayonne	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
Bayonne	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
Bayonne	9	J.F. Kennedy Boulevard and Ramp E					-	-				
Bayonne	10	J.F. Kennedy Boulevard and W. 4^{th} Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bayonne	11	J.F. Kennedy Boulevard and W. 3^{rd} Street	-	-	-	-	-	-	-	-	-	-
Bayonne	12	J.F. Kennedy Boulevard and W. 1^{st} Street	-	-	-	-	-	-	-	-	-	-
Bayonne	16	Route 440 and 5^{th} Street Connection					-	-				
Bayonne	17	Ingham Avenue and E. 5^{th} Street					-	-				
Bayonne	43	J.F. Kennedy Boulevard and W. 5^{th} Street					-	-				
Bayonne	92	Avenue A and W. 4^{th} Street	-	-	-	-	-	-	-	-	-	-
Bayonne	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
Bayonne	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
Staten Island	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
Staten Island	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
Staten Island	23	Forest Avenue and Willow Road West							-	-	-	-
Staten Island	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
Staten Island	25	Morningstar Road and St. Adalbert Place							-	-	-	-
Staten Island	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
Staten Island	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
Staten Island	28	Morningstar Road and Innis Street			-	-	-	-				
Staten Island	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
Staten Island	30	Richmond Terrace & Newark Avenue			-	-	-	-				
Staten Island	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
Staten Island	32	Nicholas Avenue and Innis Street			✓	-	-	-				
Staten Island	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
Staten Island	34	Trantor Place and Walker Street			✓	✓	✓	✓				
Staten Island	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
Staten Island	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
Staten Island	141	Morningstar Road and Newark Avenue			✓	-	-	-				
Staten Island	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
Staten Island	195	Route 440 SB ramp to Willow Road West							-	-	-	-
Staten Island	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
Staten Island	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓ *Significant Impact*
- *Location was analyzed, and no traffic impact was identified.*
[ ] *Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1**.

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10**. These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	Percentage
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1**. This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22**. These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21**. This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

Hour Beg.	New York Bound							New Jersey Bound						
	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?	2017 Traffic Volume	No Build		Const. Build		Delay (min)	Significant Impact ?
		Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service				Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service		
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

PANYNJ

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
===

The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, **a study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION
Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications
Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview
Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation
Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method
The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

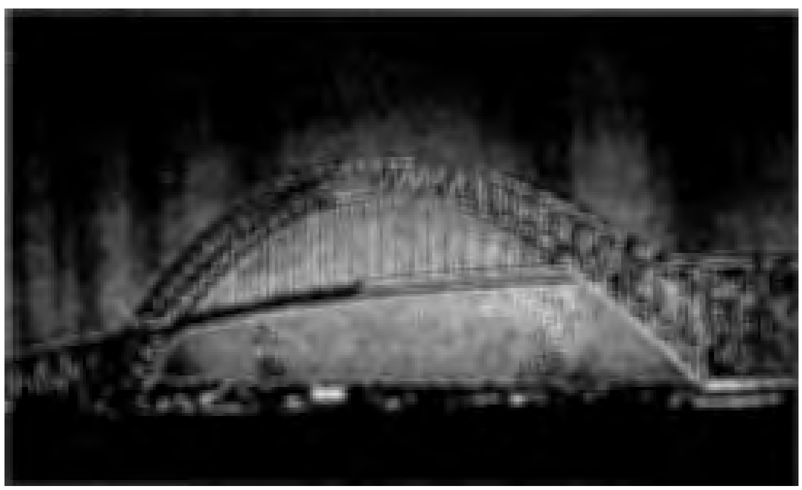
Appendix C: Transportation
Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ



Prepared By:

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VHB + Eng-Wong, Taub | Joining Forces

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Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

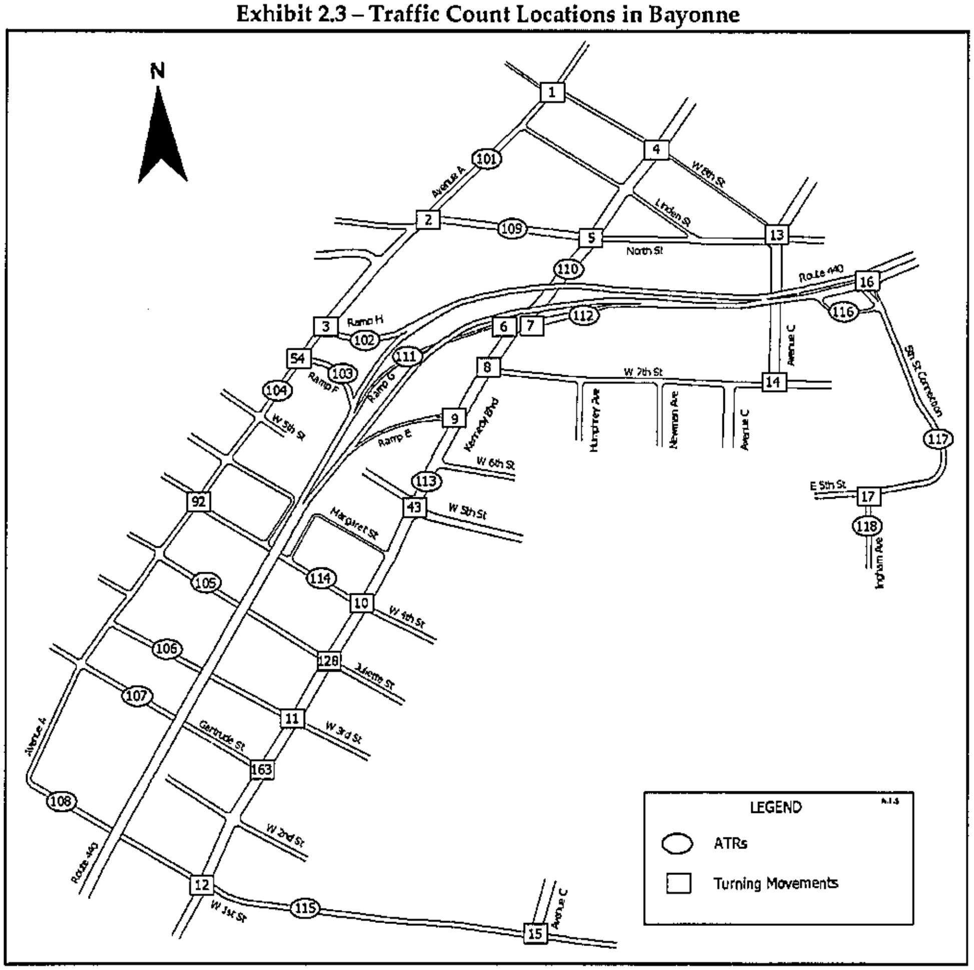

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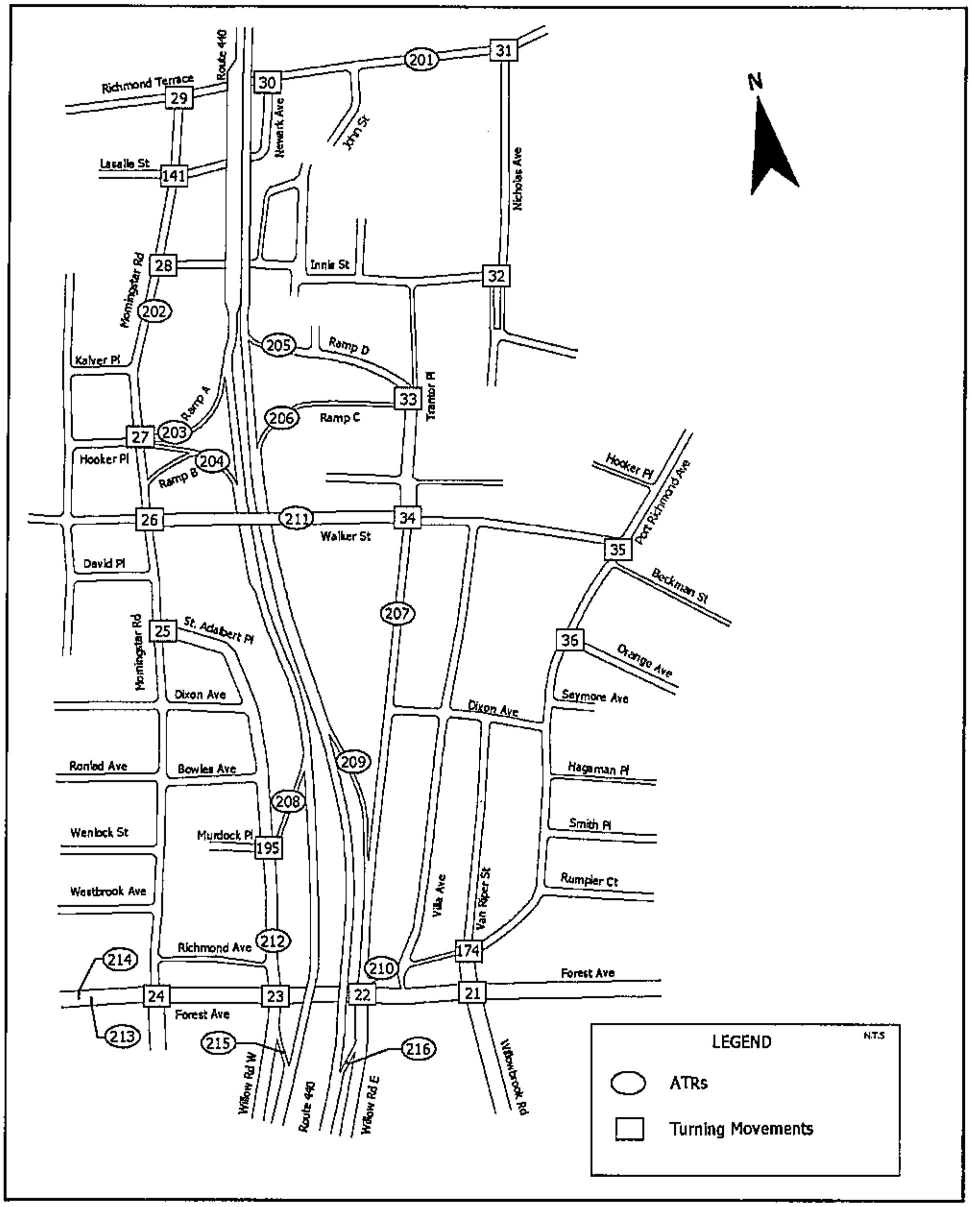
Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and **3.4** show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

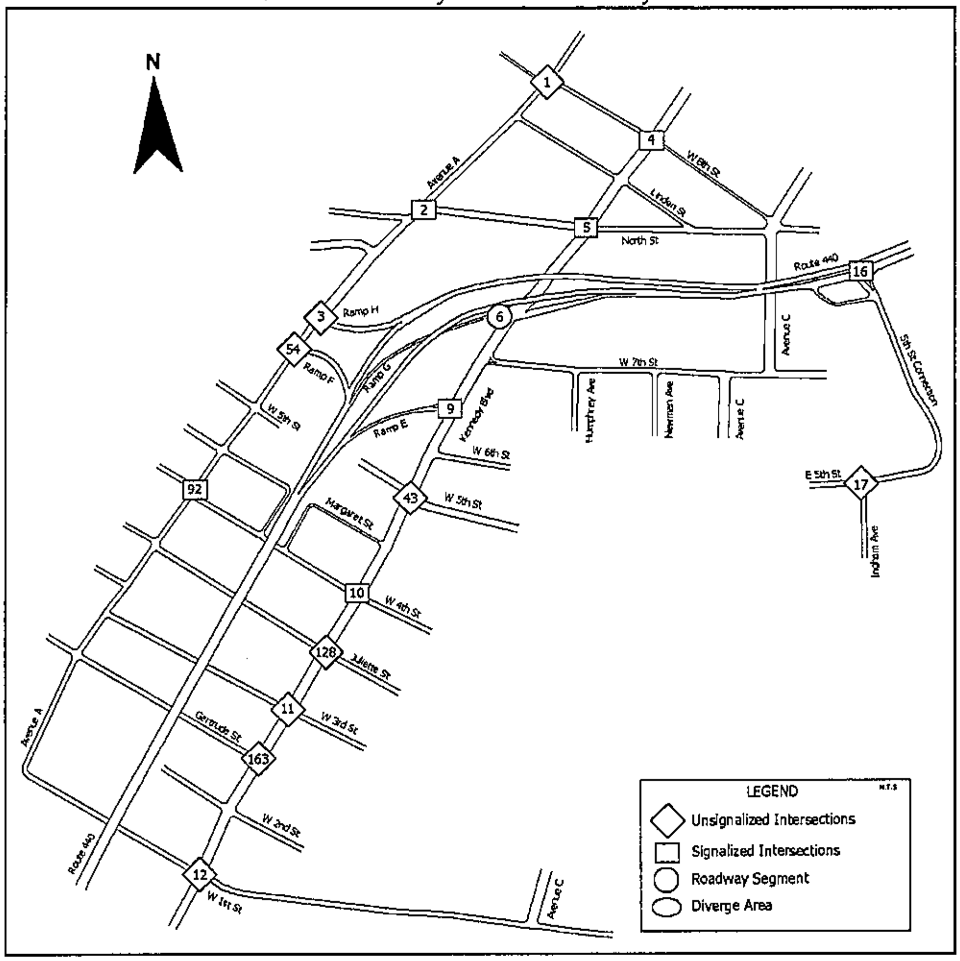
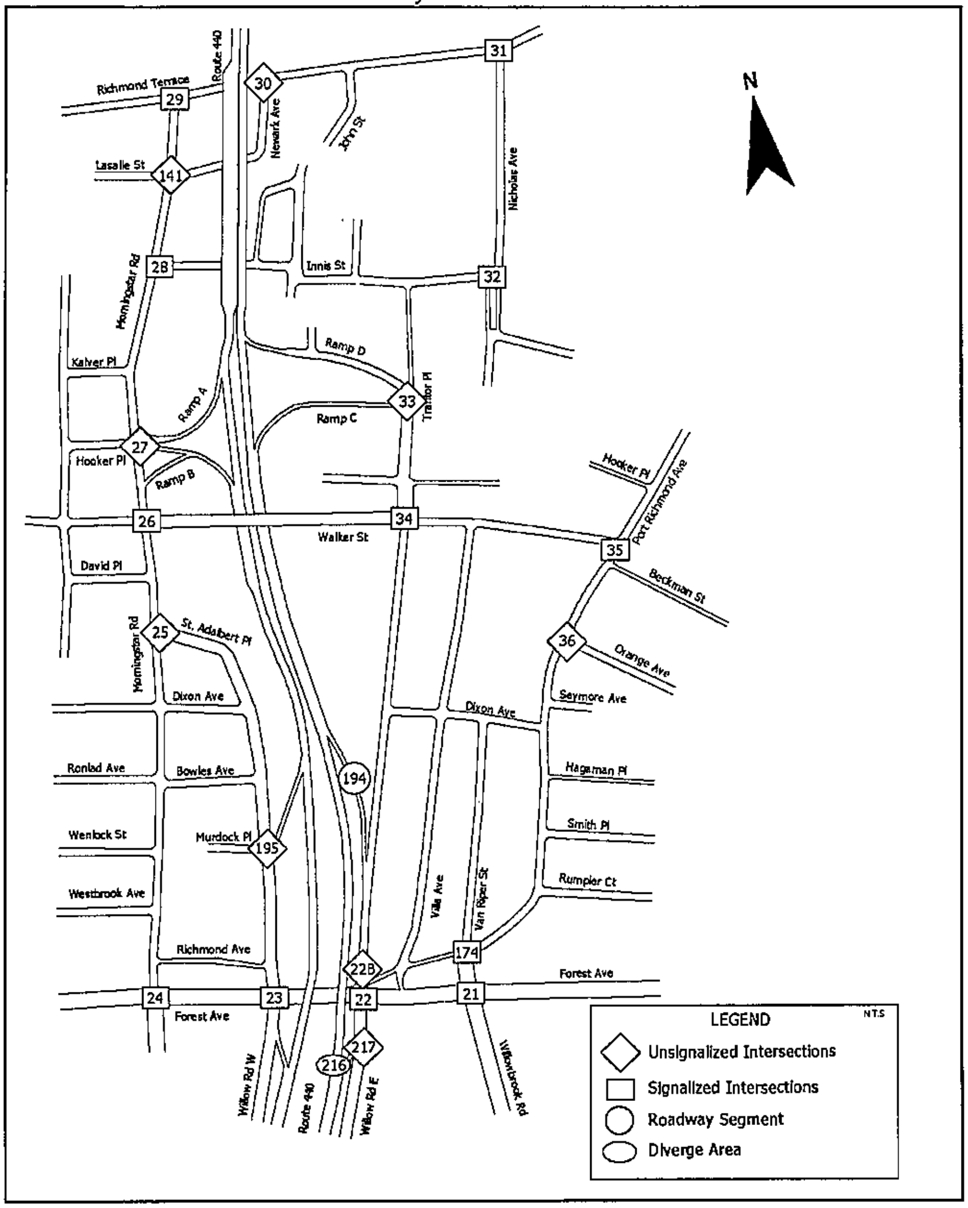


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

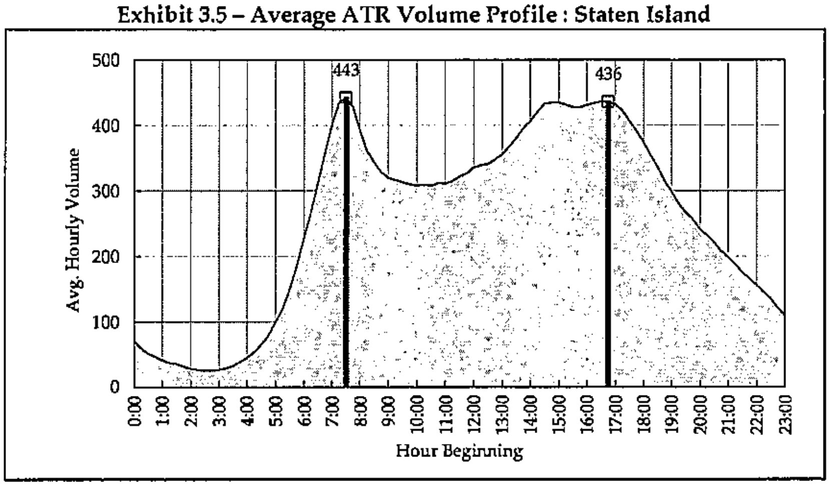
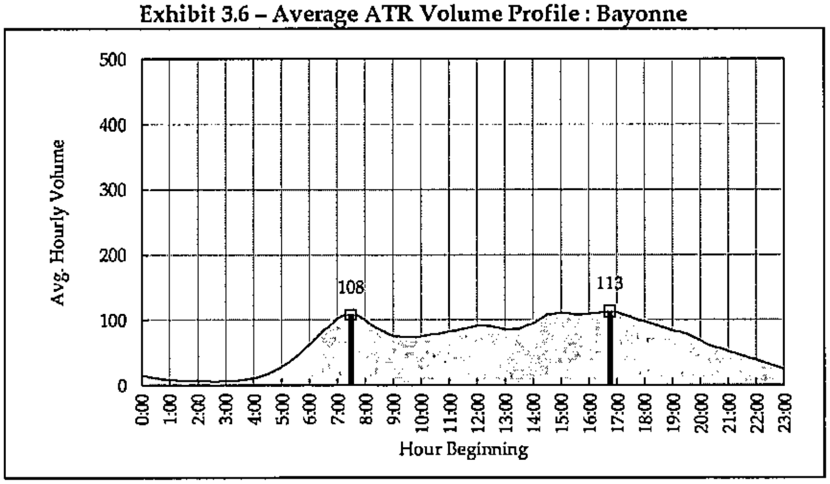


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit 3.7**, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1**. The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Origin \ Destination	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

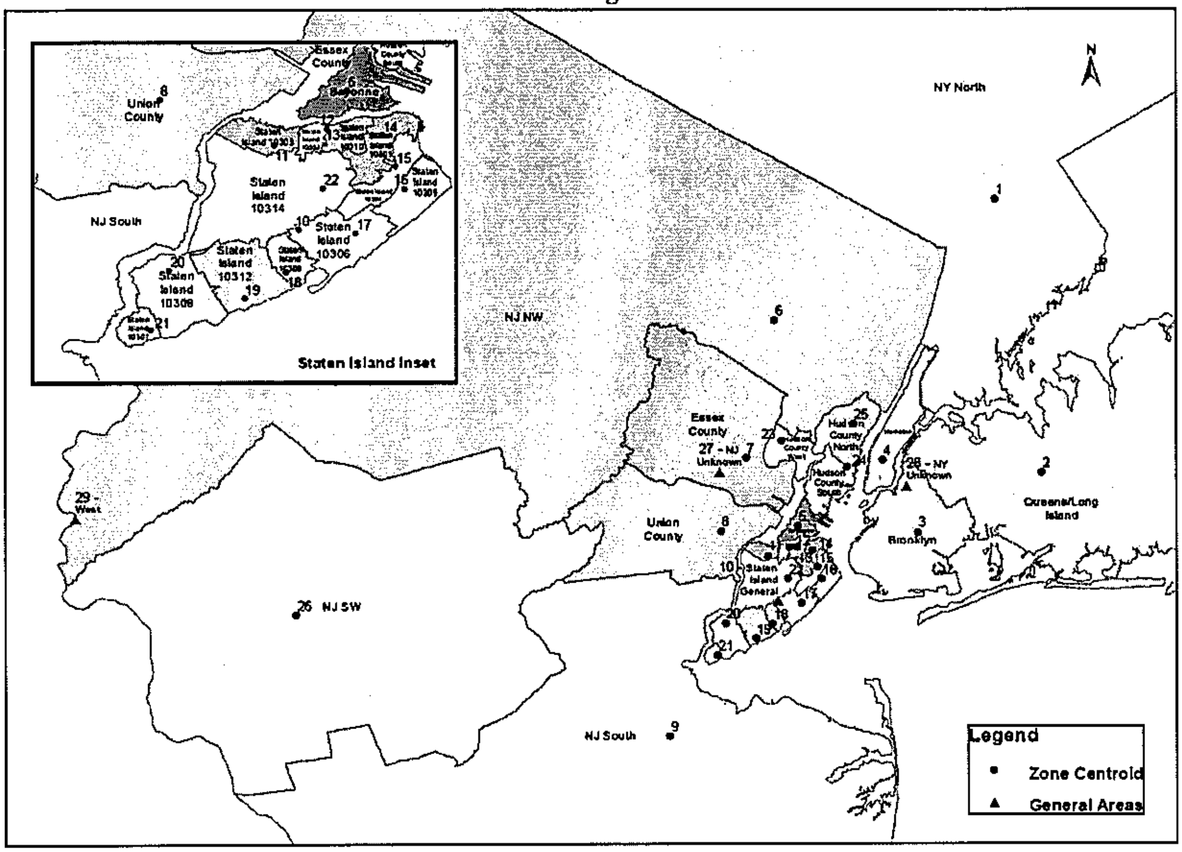


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazanc	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazanc	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
	9	J.F. Kennedy Boulevard and Ramp E					-	-				
	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
	16	Route 440 and 5th Street Connection					-	-				
	17	Ingham Avenue and E. 5th Street					-	-				
	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
	23	Forest Avenue and Willow Road West							-	-	-	-
	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
	25	Morningstar Road and St. Adalbert Place							-	-	-	-
	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
	28	Morningstar Road and Innis Street			-	-	-	-				
	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
	30	Richmond Terrace & Newark Avenue			-	-	-	-				
	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
	32	Nicholas Avenue and Innis Street			✓	-	-	-				
	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
	34	Trantor Place and Walker Street			✓	✓	✓	✓				
	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
	141	Morningstar Road and Newark Avenue			✓	-	-	-				
	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
	195	Route 440 SB ramp to Willow Road West							-	-	-	-
	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓	*Significant Impact*
-	*Location was analyzed, and no traffic impact was identified.*
(blank)	*Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1.**

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10.** These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall Percentage
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1.** This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.

[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22.** These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel <u>and</u> the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21.** This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities. 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

Hour Beg.	New York Bound 2017 Traffic Volume	NY No Build Density (pc/mi/ln)	NY No Build Level of Service	NY Const. Build Density (pc/mi/ln)	NY Const. Build Level of Service	NY Delay (min)	NY Significant Impact ?	New Jersey Bound 2017 Traffic Volume	NJ No Build Density (pc/mi/ln)	NJ No Build Level of Service	NJ Const. Build Density (pc/mi/ln)	NJ Const. Build Level of Service	NJ Delay (min)	NJ Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

PANYNJ

From:	MacSpadden, Lisa
Sent:	Friday, December 06, 2013 10:40 AM
To:	Valens, Chris
Subject:	FW: needed info
Attachments:	BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study.** The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
==

The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, **a study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION
Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications
Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation

Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ

Prepared By:

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

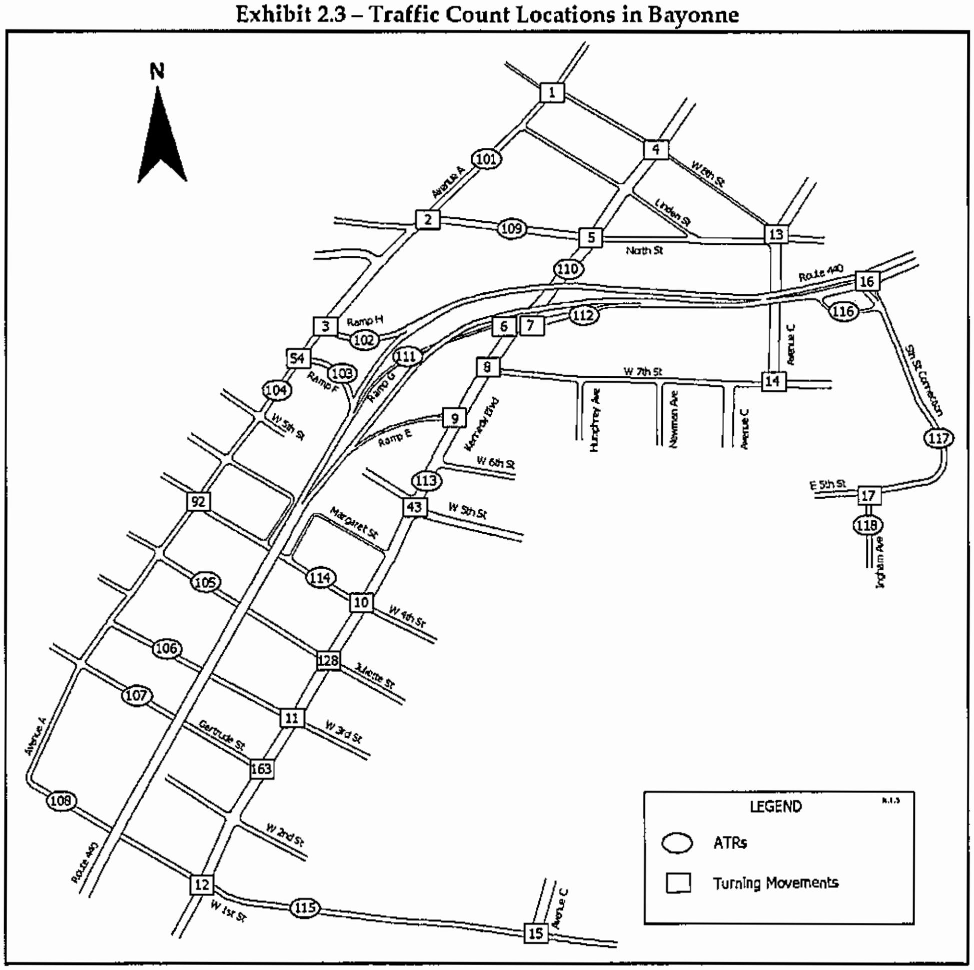
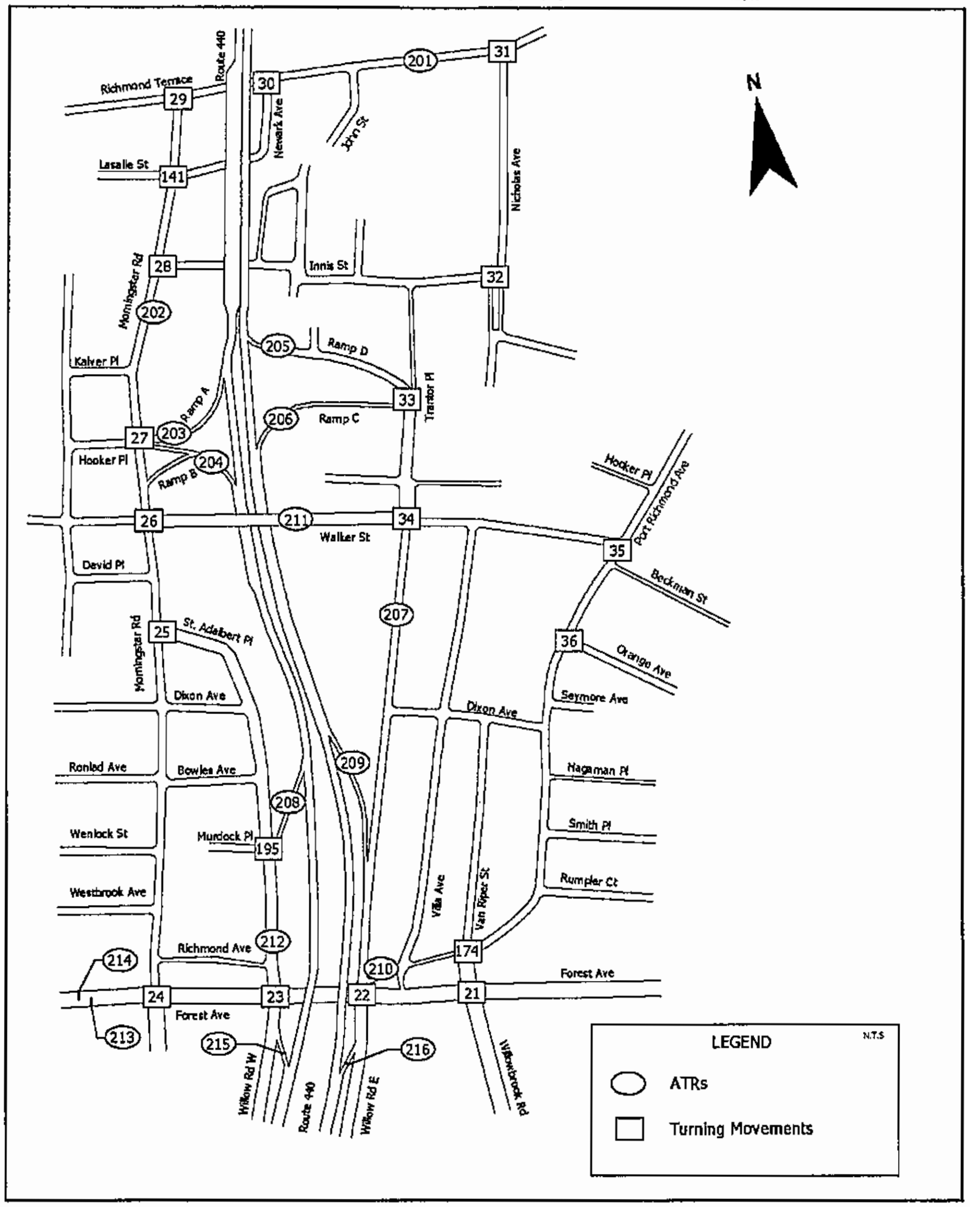


Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and 3.4 show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

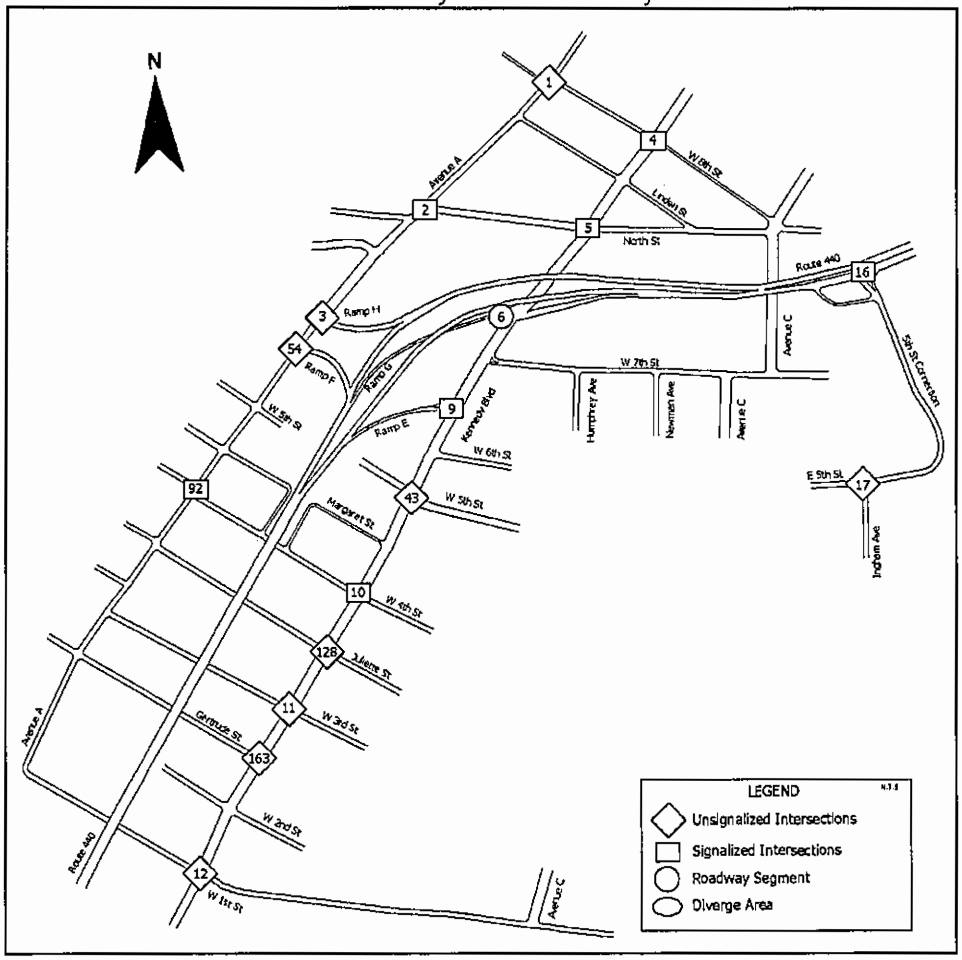
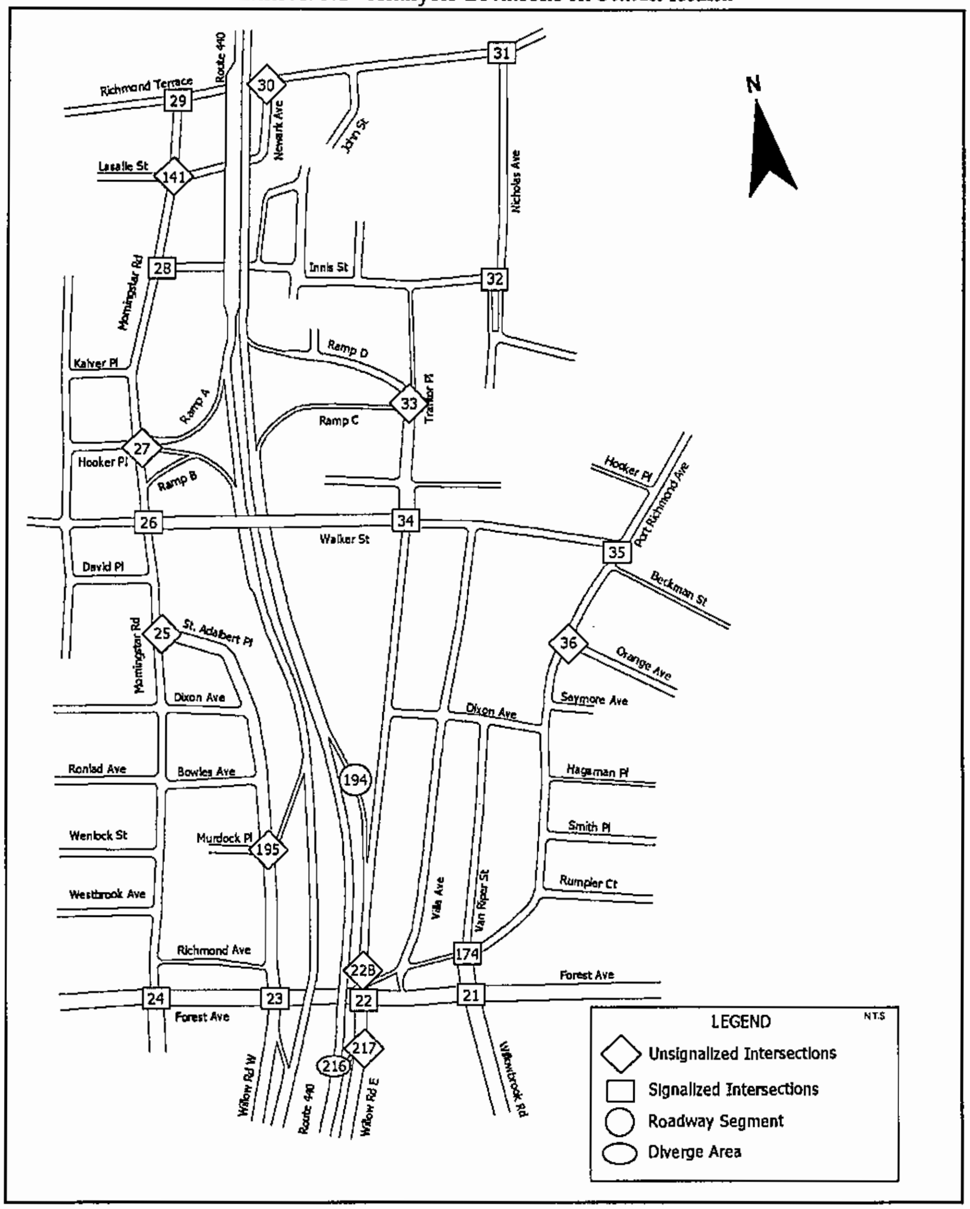


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and **3.6** show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

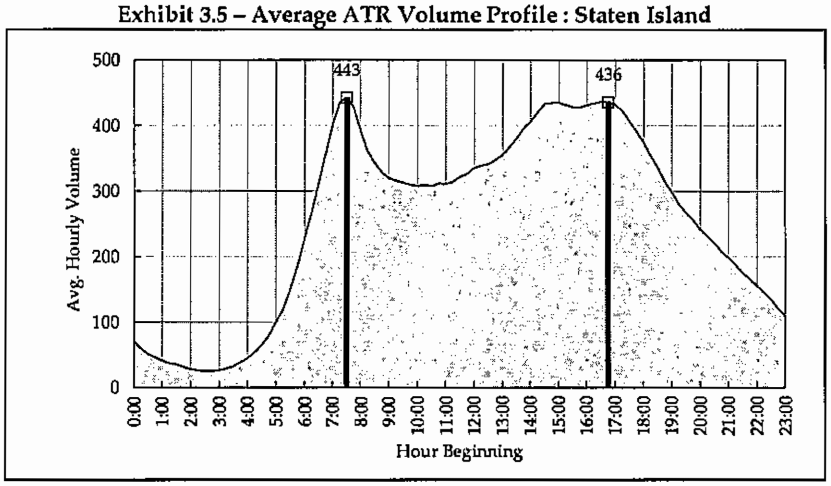
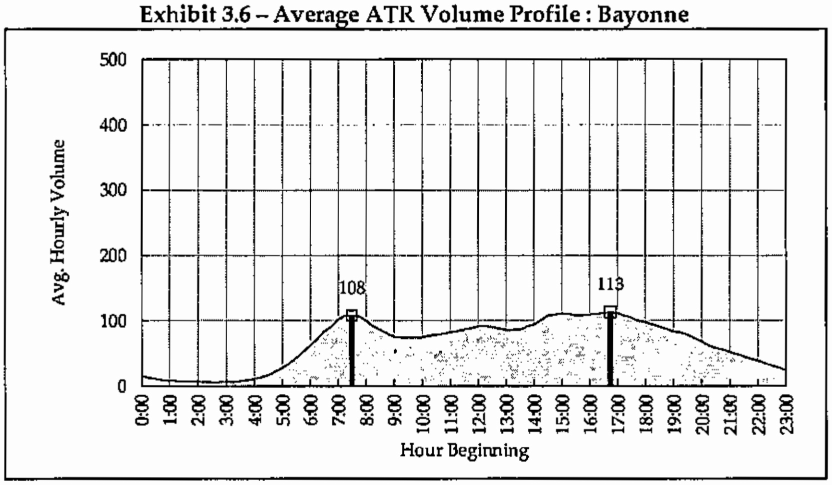


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit 3.7**, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1.** The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: 1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Destination → / Origin ↓	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

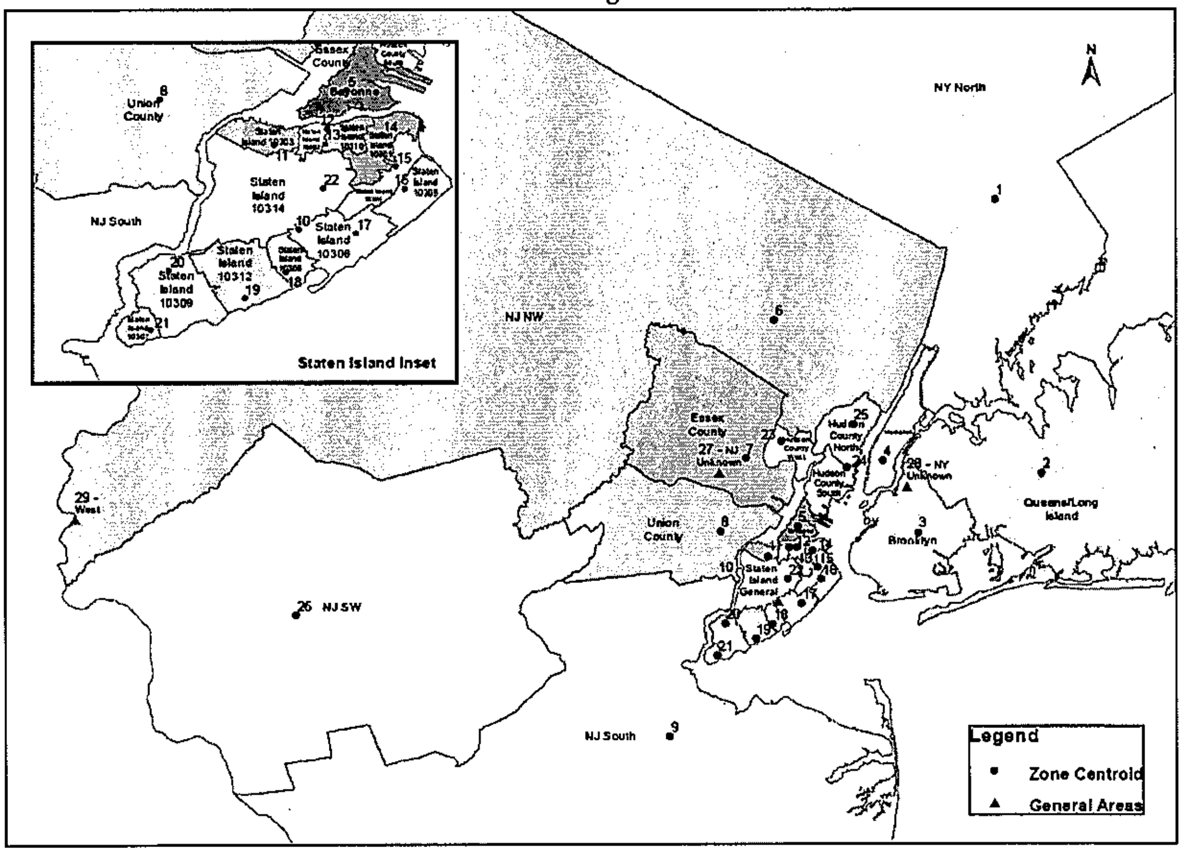


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
Bayonne	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
Bayonne	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
Bayonne	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
Bayonne	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
Bayonne	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
Bayonne	9	J.F. Kennedy Boulevard and Ramp E					-	-				
Bayonne	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bayonne	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
Bayonne	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
Bayonne	16	Route 440 and 5th Street Connection					-	-				
Bayonne	17	Ingham Avenue and E. 5th Street					-	-				
Bayonne	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
Bayonne	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
Bayonne	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
Bayonne	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
Staten Island	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
Staten Island	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
Staten Island	23	Forest Avenue and Willow Road West							-	-	-	-
Staten Island	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
Staten Island	25	Morningstar Road and St. Adalbert Place							-	-	-	-
Staten Island	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
Staten Island	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
Staten Island	28	Morningstar Road and Innis Street			-	-	-	-				
Staten Island	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
Staten Island	30	Richmond Terrace & Newark Avenue			-	-	-	-				
Staten Island	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
Staten Island	32	Nicholas Avenue and Innis Street			✓	-	-	-				
Staten Island	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
Staten Island	34	Trantor Place and Walker Street			✓	✓	✓	✓				
Staten Island	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
Staten Island	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
Staten Island	141	Morningstar Road and Newark Avenue			✓	-	-	-				
Staten Island	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
Staten Island	195	Route 440 SB ramp to Willow Road West							-	-	-	-
Staten Island	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
Staten Island	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓ *Significant Impact*

- *Location was analyzed, and no traffic impact was identified.*

(empty box) *Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit 5.2** shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit 5.3** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit 5.7** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1**.

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10**. These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	Percentage
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1**. This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.

[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22**. These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21.** This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and **5.24** show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	Increase (min/veh)
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

Hour Beg.	New York Bound: 2017 Traffic Volume	NY No Build: Density (pc/mi/ln)	NY No Build: Level of Service	NY Const. Build: Density (pc/mi/ln)	NY Const. Build: Level of Service	NY Delay (min)	NY Significant Impact ?	New Jersey Bound: 2017 Traffic Volume	NJ No Build: Density (pc/mi/ln)	NJ No Build: Level of Service	NJ Const. Build: Density (pc/mi/ln)	NJ Const. Build: Level of Service	NJ Delay (min)	NJ Significant Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

PANYNJ

From: MacSpadden, Lisa
Sent: Friday, December 06, 2013 10:40 AM
To: Valens, Chris
Subject: FW: needed info
Attachments: BBNCP - Appendix C - Traffic Analysis 06-23-12.pdf

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From: Ma, John
Sent: Thursday, December 05, 2013 4:39 PM
To: Garten, David; MacSpadden, Lisa
Subject: Fw: needed info

From: Rivera, Jose
Sent: Thursday, December 05, 2013 02:52 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Another type of traffic study is the **Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program** (BBNCP). This study focused on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts were also identified in the study.

Below is a link to the Final Environmental Assessment (EA). The final traffic analysis is in Appendix C.

http://www.regulations.gov/#!documentDetail;D=USCG-2012-1091-0118

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:37 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Additionally, attached is a copy of the **PN/EPAMT Comprehensive Traffic Study**. The intent of this 2006 Study was to reevaluate the future conditions of the roadway network, with the incorporation of the updated growth projections, and to reassess the roadway improvements identified in the 2005 Priority Capital Program.

Jose

From: Rivera, Jose
Sent: Thursday, December 05, 2013 2:32 PM
To: Zipf, Peter; Ma, John
Subject: RE: needed info

John, Peter,

Attached are three traffic studies that were conducted by Traffic Engineering for various projects which represent various types of studies. Others to follow.

- **JFK Terminal 7 2013 Analysis Report** - summarizes the findings of a traffic study conducted for the Orange Quadrant roadway network associated with the implementation of a future flight schedule
- **JFK Truck Stop Site Dev Report** - documents the traffic impact analysis Traffic Engineering performed to assess the operational repercussions to traffic flows along the local street network with the construction of a proposed mixed-use site development at JFK International Airport
- **GWB EB Report** - includes travel time graphs that show the comparison of travel times from 12/04-12/05 with 11/20-11/21 for the GWB Main Span Upper Level Structural Steel Rehabilitation project.

Jose

From: Zipf, Peter
Sent: Thursday, December 05, 2013 11:59 AM
To: Ma, John
Cc: Rivera, Jose
Subject: FW: needed info
Importance: High

John,

Here is the requested information from Jose as we discussed yesterday.

In essence of time – if you need more – please feel free to contact Jose.

If needed, Jose can send "the book" over but I think the below summation frames out what you had asked about.

Jose will send over some sample results.

Peter
==
===============
The **Manual of Transportation Engineering Studies, 2nd Edition** is a "how to" guide on conducting various studies using standardized study techniques and current technology. In Chapter 1 - Introduction; Section 4 - General Tips for Conducting Transportation Studies; Paragraph 4.1 - Definitions:

> This book is a manual of transportation studies. In this context, a **study is defined as the detailed examination and analysis of all or parts of a transportation system, supported by empirical data collection.** The study starts with the identification and definition of a transportation problem, followed

by the design and execution of (field) data collection and the reduction and analysis of the data in the office. A study is typically performed to explore a specific aspect of or question about a transportation system, and study results are usually written up in a report or similar document.

Transportation studies are oftentimes supported by data collection to empirically gather data in support of the study. Data collection traditionally is performed in the field using various study techniques and data collection equipment that are described in more detail throughout this manual. A study technique describes the step-by- step procedure used for gathering data. Data collection equipment refers to a technological device that is specifically designed to measure one or more data elements (for example, volumes or speeds). Data collection for transportation studies can also be performed without gathering data in the field, but by extracting information from a central system (for example, the U.S. Census or other database), or by modeling the transportation system in a traffic simulation tool.

Additional information from **Chapter 9 - Travel Time and Delay Studies**:

1.0 INTRODUCTION
Travel time and delay are two of the principal measures of highway system performance used by traffic engineers, planners and analysts. Vehicle speed is directly related to travel time and delay and is also used to evaluate traffic and highway systems. There are two types of average speed: time-mean speed (TMS) (or mean spot speed) and space-mean speed (SMS) (or mean travel speed). Measuring TMS is described in Chapter 5. SMS is covered in this chapter by examining the mean travel time in relation to the segment length.

Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications
Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;

- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview
Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation
Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

3.1.5 Extrapolation Method
The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

Appendix C: Transportation

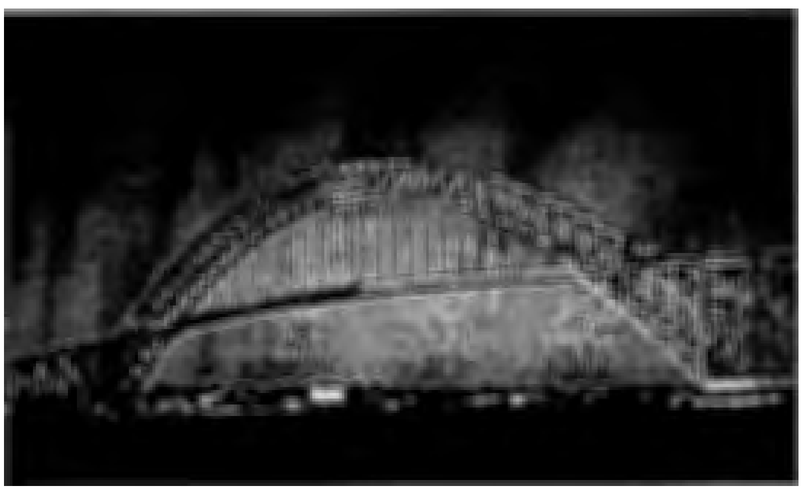
Traffic Study

Traffic Analysis to Support the Environmental Review of the Bayonne Bridge Navigational Clearance Program

Draft Report
June 2012

Prepared For:

THE PORT AUTHORITY OF NY & NJ



Prepared By:

VHB

Vanasse Hangen Brustlin, Inc.

VHB + Eng-Wong, Taub | Joining Forces

Table of Contents

1. INTRODUCTION

The Bayonne Bridge, which connects Bayonne, New Jersey, with Staten Island, New York, spanning the Kill Van Kull currently has a 151-foot air draft restriction that restricts the access of larger ships to the Port Newark and the Elizabeth Port Authority Marine Terminals in New Jersey and Howland Hook on Staten Island.

In 2009, the US Army Corps of Engineers concluded that raising the Bridge to eliminate the current air draft restriction would produce an estimated $3.3-billion dollar national benefit. As a result, the Port Authority of New York and New Jersey (PANYNJ) announced in 2010 the "Raise the Roadway" alternative to provide a solution to the Bayonne Bridge clearance issue by raising the bridge's roadway to approximately 215 feet. The 64 feet of additional air draft would allow the PANYNJ to benefit from the increased deployment of larger, operationally efficient and environmentally beneficial vessels, via the Suez Canal and an expanded Panama Canal, to reach the PANYNJ's main terminals. The proposed billion-dollar bridge project would modernize its roadway portions while retaining the character and historic design of the 80-year-old facility.

In 2011, the PANYNJ retained VHB Inc. to perform a traffic study to support the environmental review of the Bayonne Bridge Navigational Clearance Program. This study focuses on identifying regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, and the full closure of the Bayonne Bridge that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing and the Verrazano Narrows Bridge. Mitigation measures to address those impacts are also identified in the study.

2. DATA COLLECTION

Traffic Volume Data

Traffic volume data were collected at key locations to assist in the analysis of the local roadway networks. Automatic Traffic Recorders (ATRs) were installed at 34 roadway segments (18 in Bayonne and 16 in Staten Island) for continuous 24-hour vehicle traffic counts. Turning movement counts were also conducted at 41 locations (22 in Bayonne and 19 in Staten Island).

The ATRs recorded a full week's worth of data for the Bayonne and Staten Island locations. Bayonne ATR counts were collected from Sunday, November 13, 2011 to Saturday, November 19, 2011, while Staten Island ATRs were collected from Tuesday, November 29 to Monday, December 5, 2011. Each ATR was subjected to a 30-minute calibration count during the AM and PM peak periods (6 AM to 9 AM and 4 PM to 6 PM, respectively). **Exhibit 2.1** lists the ATR locations and their corresponding location ID.

Exhibit 2.1 – ATR Locations

	Loc. ID	Location
Bayonne	101	Avenue A, North of North Street
	102	Ramp H (Off-ramp from Route 440 to Avenue A)
	103	Ramp F (On-ramp to Route 440 from Avenue A)
	104	Avenue A, North of W. 5th Street
	105	Juliette Street, East of Avenue A
	106	W. 3rd Street, East of Avenue A
	107	Gertrude Street, East of Avenue A
	108	W. 1st Street, East of Avenue A
	109	North Street, East of Avenue A
	110	J.F. Kennedy Boulevard, South of North Street
	111	Ramp G (from J.F. Kennedy Boulevard to Route 440 South)
	112	Ramp from J.F. Kennedy Boulevard to Route 440 North
	113	J.F. Kennedy Boulevard, North of W. 5th Street
	114	W. 4th Street, West of J.F. Kennedy Boulevard
	115	W. 1st Street, East of J.F. Kennedy Boulevard
	116	Route 440 and 5th Street Connector Jughandle
	117	5th Street Connector, South of Route 440
	118	Ingham Avenue, South of E. 5th Street
Staten Island	201	Richmond Terrace, West of Nicholas Avenue
	202	Morningstar Road, South of Innis Street
	203	Ramp A (from Southbound Route 440 to Morningstar Road)
	204	Ramp B (from Morningstar Road to Southbound Route 440)
	205	Ramp D (from Trantor Place to Northbound Route 440)
	206	Ramp C (from Northbound Route 440 to Trantor Place)
	207	Trantor Place, South of Walker Street
	208	Ramp from Southbound Route 440 to Willow Road West
	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
	210	Right turn from Port Richmond Avenue to Trantor Place
	211	Walker Street,West of Trantor Place
	212	Southbound Willow Road, North of Richmond Avenue
	213	Eastbound Forest Avenue, West of Morningstar Road
	214	Westbound Forest Avenue, West of Morningstar Road
	215	Ramp from Willow Road West to SB Route 440
	216	Ramp from NB Route 440 to Willow Road East

Turning Movement Counts (TMCs) were conducted at 41 key locations during the same weeks as the ATR counts. Bayonne TMCs, at 22 intersections, were collected from Tuesday, November 15 to Friday, November 18, 2011 and Staten Island TMCs, at 19 intersections, were collected from Tuesday, November 29 to Thursday, December 1, 2011.

The turning movement counts were conducted using Miovision video collection units, an innovative technology consisting of a video camera on top of a tripod or pole-mounted. After recording the data, each video was uploaded to the Miovision server, where their software automatically classified and counted the traffic by minute. The Miovision video analysis software can classify vehicles into four categories: autos, medium trucks, heavy trucks, and buses.

While the video collection units recorded the intersections from approximately 6 AM to 7 PM, volumes were calculated for the AM and PM peak periods only. **Exhibit 2.2** lists the TMC locations and their corresponding location ID, and **Exhibits 2.3** and **2.4** show the ATR and TMC locations for Bayonne and Staten Island, respectively.

Exhibit 2.2 – Turning Movement Count Locations

	Loc. ID	Location
Bayonne	1	Avenue A and W. 8th Street
	2	Avenue A and North Street
	3	Avenue A and Route 440 SB Exit Ramp H
	54	Avenue A and Route 440 SB Entrance Ramps F
	4	J.F. Kennedy Boulevard and W. 8th Street
	5	J.F. Kennedy Boulevard and North Street
	6	Ramp G (from J.F. Kennedy Boulevard to Route 440 SB)
	7	J.F. Kennedy Boulevard and ramp to Route 440 NB
	8	J.F. Kennedy Boulevard and W. 7th Street
	9	J.F. Kennedy Boulevard and Ramp E
	10	J.F. Kennedy Boulevard and W. 4th Street
	11	J.F. Kennedy Boulevard and W. 3rd Street
	12	J.F. Kennedy Boulevard and W. 1st Street
	13	Avenue C and North Street
	14	Avenue C and W. 7th Street
	15	Avenue C and W. 1st Street
	16	Route 440 and 5th St. Connection
	17	Ingham Ave. and E. 5th Street
	43	J.F. Kennedy Boulevard and W. 5th Street
	92	Avenue A and W. 4th Street
	128	J.F. Kennedy Boulevard and Juliette Street
	163	J.F. Kennedy Boulevard and Gertrude Street
Staten Island	21	Forest Avenue and Willowbrook Road
	174	Port Richmond Avenue and Van Riper Street
	22	Forest Avenue and Willow Road East
	23	Forest Avenue and Willow Road West
	24	Forest Avenue and Morningstar Road / Richmond Avenue
	25	Morningstar Road and St Adalbert Place
	26	Morningstar Road and Walker Street
	27	Morningstar Road and Route 440 SB Ramps A and B
	28	Morningstar Road and Innis Street
	29	Morningstar Road and Richmond Terrace
	30	Richmond Terrace and Newark Avenue
	31	Richmond Terrace and Nicholas Avenue
	32	Nicholas Avenue and Innis Street
	33	Trantor Place and Route 440 NB Ramps C and D
	34	Trantor Place and Walker Street
	35	Port Richmond Avenue and Walker Street
	36	Port Richmond Avenue and Orange Avenue
	141	Morningstar Road and Lasalle Street / Newark Avenue
	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place

Additional intersections were spot counted for 10 minutes each to assist in the balancing of the overall roadway networks. With the counts, VHB conducted physical inventories of key analysis locations, field observations of timing and phasing plans for the signalized intersections, level of service (LOS) observations, and travel time runs.

Physical Inventories

Physical inventories of key analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g. "No Turn on Red" signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

Signalized Intersection Timing Plans

VHB collected signal timing data at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had progression, field observed offsets were also collected. In addition to collecting the field observed timings, VHB also obtained the official timing plans. The timings were used to assist in the creation of the Synchro model.

Level of Service Observations

Level of service observations were taken at the key analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on green. Each observation was conducted during both the AM and PM peak periods while the volume counts were being conducted, and included multiple observations within each hour.

Exhibit 2.3 – Traffic Count Locations in Bayonne

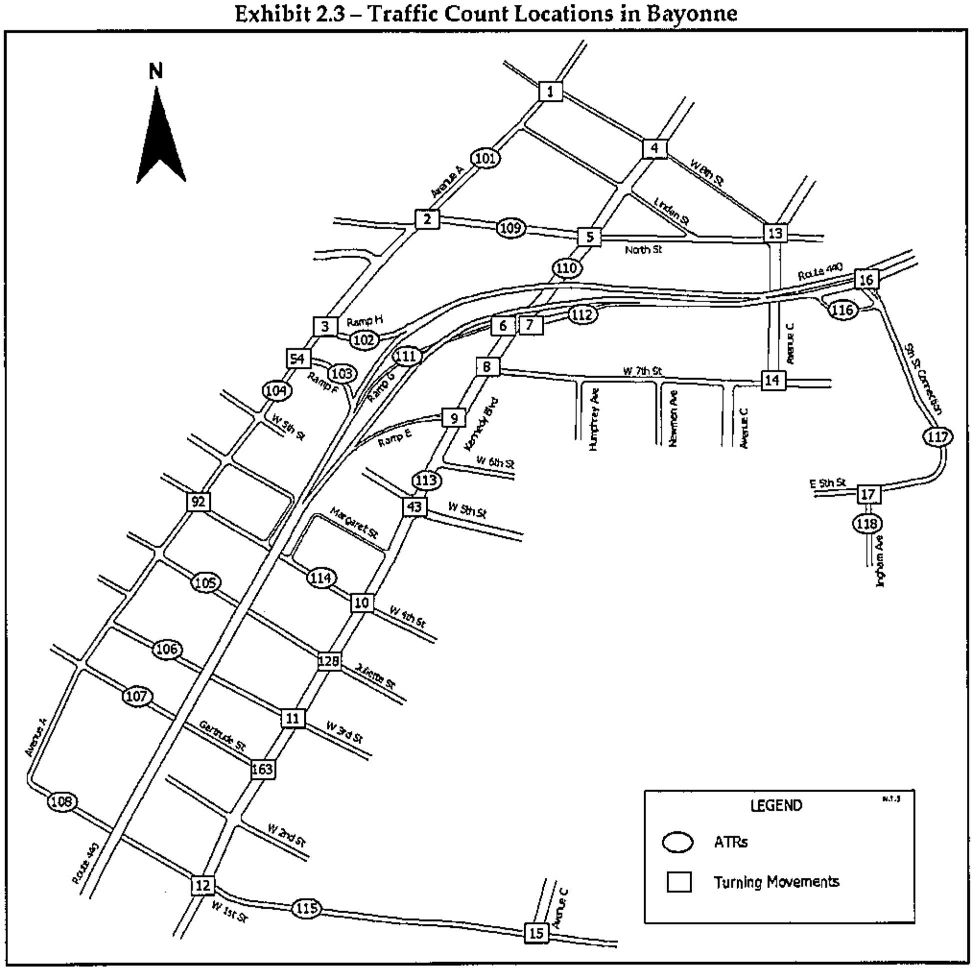
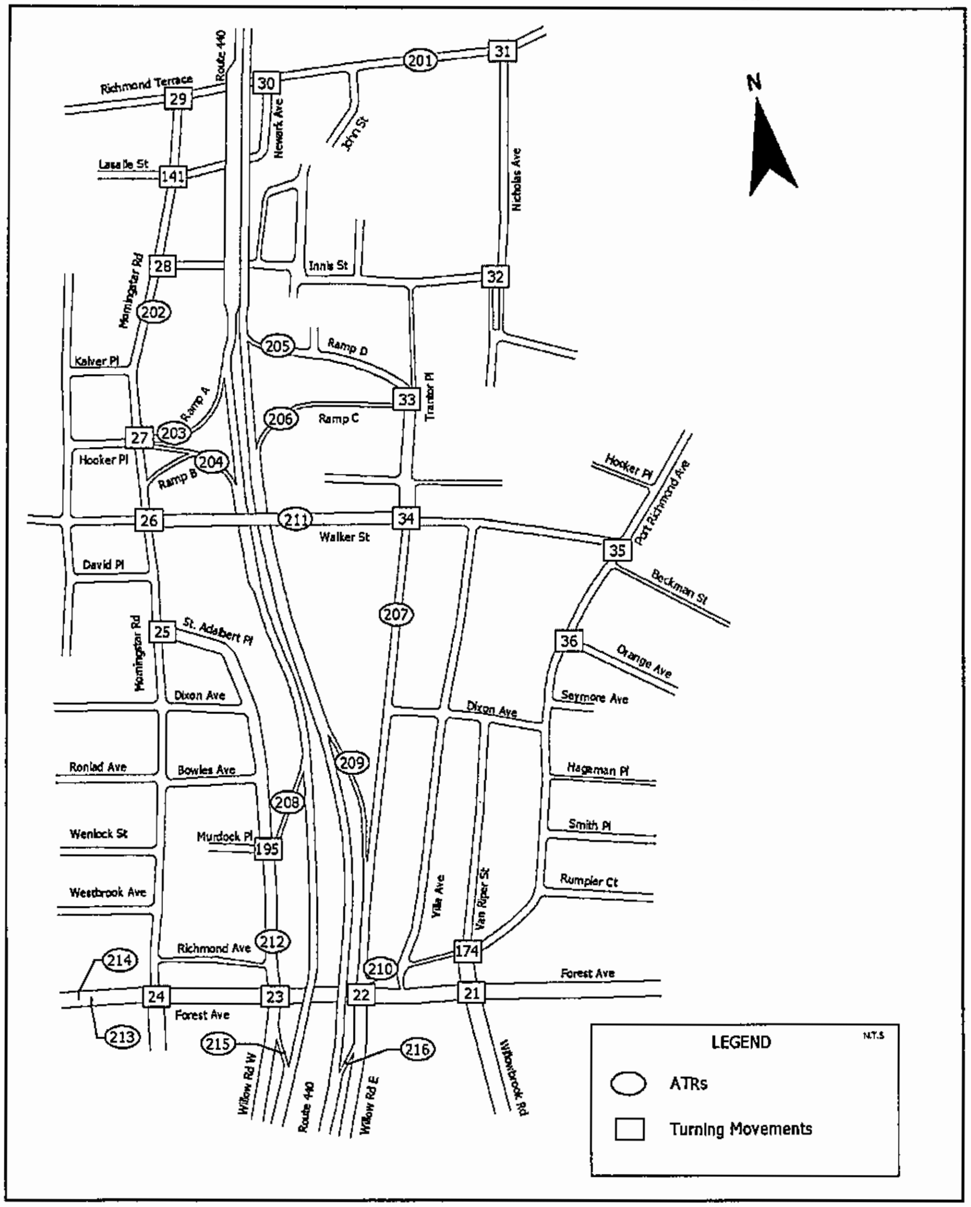


Exhibit 2.4 – Traffic Count Locations in Staten Island



Travel Time Runs

Travel time runs were conducted for six corridors within the study area. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Exhibit 2.5** lists the corridors, with the start and end streets for each segment.

Exhibit 2.5 – Speed Runs Conducted

No	Description	From	To	City	Run Period	Number of Runs	Run Hours
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Blvd	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	E 2nd Street	E. 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM

All speed runs were conducted on Tuesday, November 29, 2011.

3. LOCAL ANALYSIS METHODOLOGY

Construction Stages

The first step in the traffic analysis of the local roadway network was to review five construction stages developed by the PANYNJ for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that will be closed at certain times during construction; **Exhibit 3.1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road
- Ramp B: Route 440 on-ramp from Morningstar Road
- Ramp C: Route 440 off-ramp to Trantor Place
- Ramp D: Route 440 on-ramp from Trantor Place
- Northbound Newark Avenue and Eastbound Innis Street

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to J. F. Kennedy Boulevard
- Ramp G: Route 440 on-ramp from J. F. Kennedy Boulevard
- Ramp F: Route 440 on-ramp from Avenue A
- Ramp H: Route 440 off-ramp to Avenue A
- Bayonne Underpasses (Juliette Street, W. 3rd Street, and Gertrude Street)

Exhibit 3.1 – Street Closure Schedule by Construction Stage

Construction Stage	Street Closures in Staten Island						Street Closures in Bayonne				
	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Ramp H	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-		Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed		Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed		Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-		Closed

[1] For analysis purposes, it is assumed that the underpasses of Juliette Street, W. 3rd Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to W. 4th Street and W. 1st Street, which will remain open at all times.

The PANYNJ identified the main detour routes for each street closure; as a result, VHB staff identified 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours. **Exhibit 3.2** lists the analysis locations by construction stage.

Exhibit 3.2 - Analysis Locations by Construction Stage

	Analysis Location			Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	J.F. Kennedy Boulevard and W. 8th Street	✓			✓	✓
	5	S	J.F. Kennedy Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	J.F. Kennedy Boulevard and Ramp E			✓		
	10	S	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	J.F. Kennedy Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	J.F. Kennedy Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	J.F. Kennedy Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	J.F. Kennedy Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	J.F. Kennedy Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

S – Signalized Intersection *U – Unsignalized Intersection* *R – Roadway Segment* *D – Diverge Area*

Exhibits 3.3 and **3.4** show the analysis locations in Bayonne and Staten Island, respectively.

Exhibit 3.3 - Analysis Locations in Bayonne

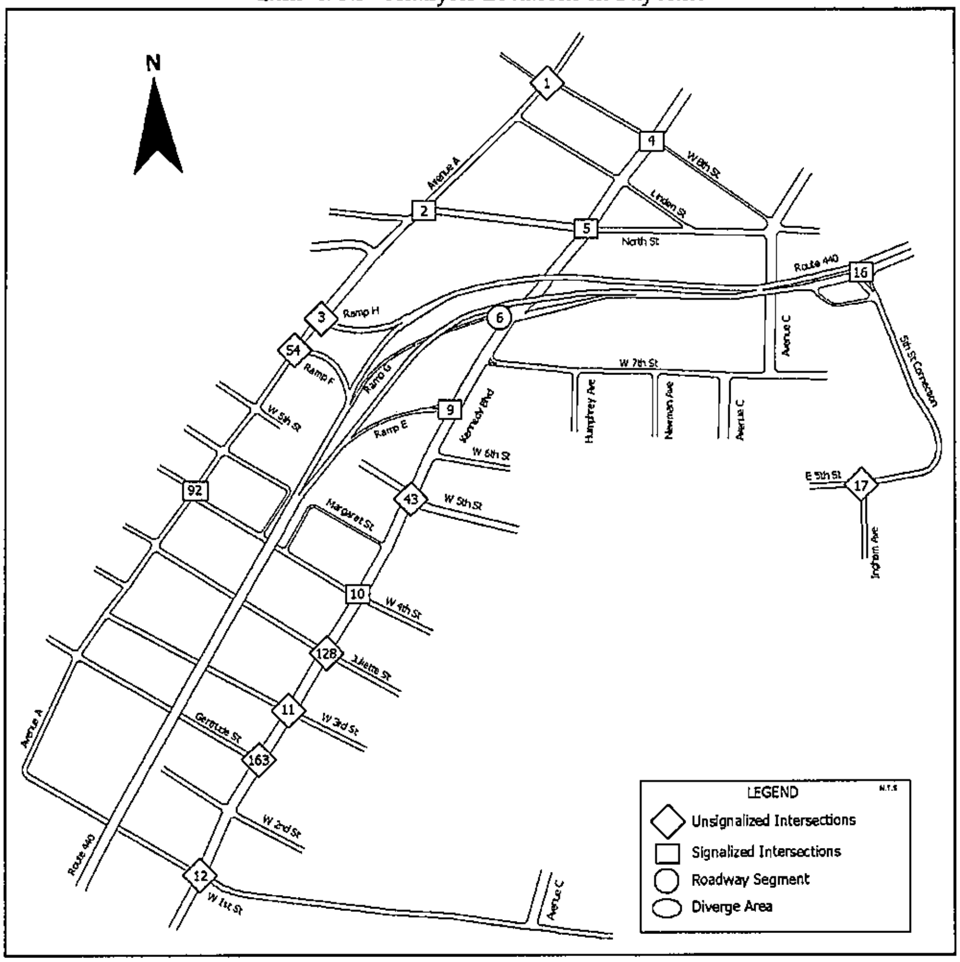
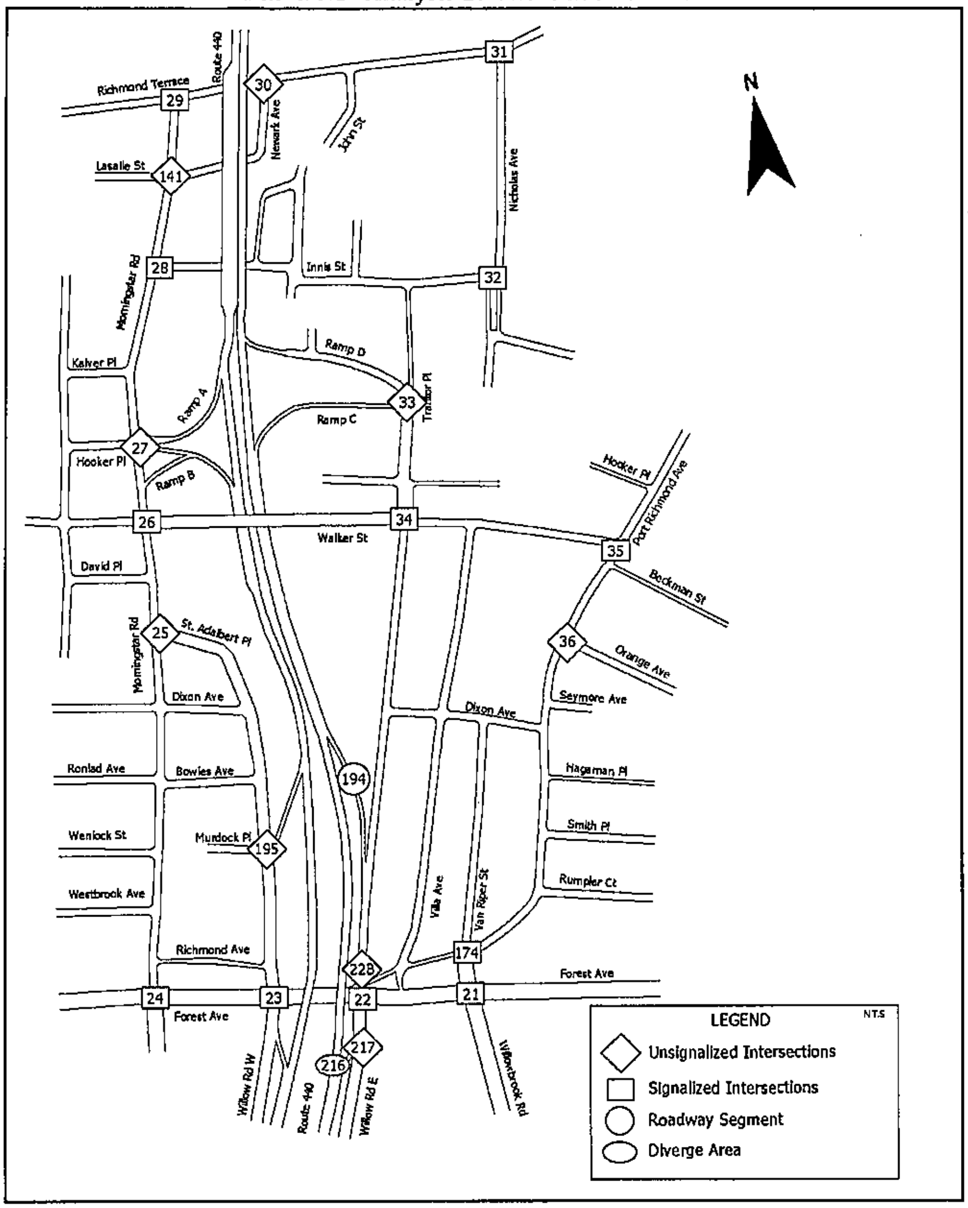


Exhibit 3.4 - Analysis Locations in Staten Island



Traffic Counts and Peak Hours

Once the analysis locations were identified, an extensive traffic count program was carried out in November 2011 to gather the traffic volumes needed to produce the existing conditions flow maps during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments and 10-minute sample counts at other supplemental local intersections as detailed previously in Chapter 2.

Intersection operations were recorded from approximately 6 AM to 7 PM using pole mounted video cameras. ATRs recorded traffic volumes in 15-minute intervals for a full week, and sample counts were performed during the AM and PM peak periods at several local intersections to support the balancing of traffic volumes in the local roadway network.

ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM. The ATR data also showed that no local roadway experienced significant traffic peaks beyond the system peak hours.

Exhibits 3.5 and 3.6 show the average ATR profiles found in each jurisdiction. These profiles were calculated by adding the traffic volumes at each ATR location, and dividing the total by the number of locations.

TMC videos were decoded and processed only for the peak hours to obtain 15-minute volume counts, categorized into four vehicle classes: autos, medium trucks, large trucks and buses. The results were tabulated in MS Excel spreadsheets.

Exhibit 3.5 – Average ATR Volume Profile : Staten Island

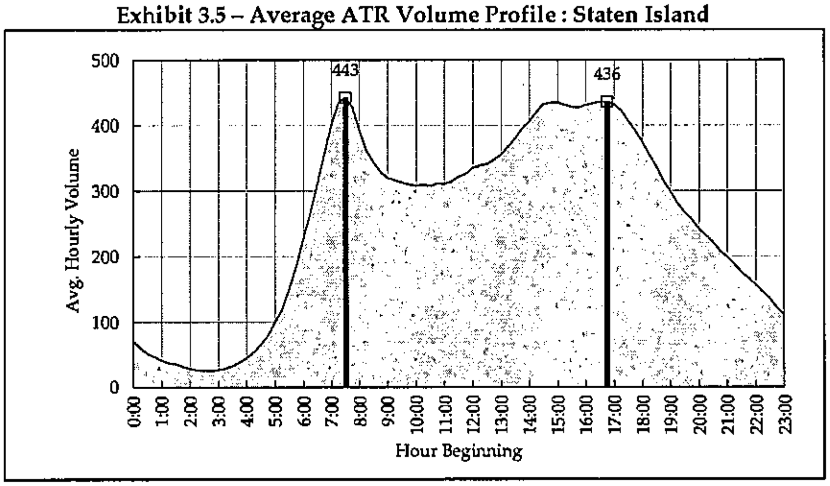
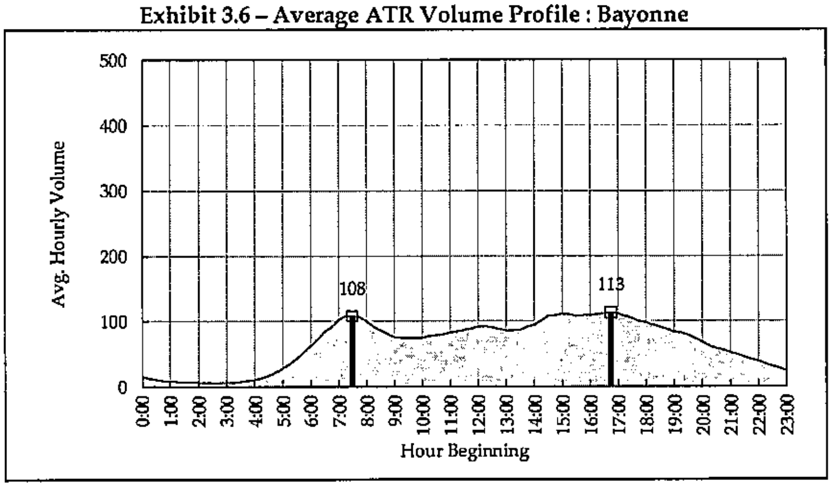


Exhibit 3.6 – Average ATR Volume Profile : Bayonne



Operational Analysis Methodology

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000 (HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments.

Analysis Scenarios

Existing Conditions Scenario

This scenario represents traffic operations in November 2011 (when the traffic data were collected). Existing peak hour flow maps were developed by balancing traffic volume data gathered from the TMCs, ATRs, and sample counts and were later used in the operational analysis.

Peak hour volumes were later expanded to 24-hour volumes (in 15-minute intervals) using the volume profiles of adjacent ATRs as a reference. The resulting volumes are capable of testing the impact of other closure schemes that could be necessitated during construction but not anticipated at this time.

No Build Scenario

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Exhibit** 3.7, and then added to calculate the resulting traffic volumes.

Exhibit 3.7 – Yearly Background Growth Rates

Direction / Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 NY Bound [1]	2.71%	1.92%
Route 440 NJ Bound [1]	0.30%	2.07%
Bayonne [2]	2.00%	
Staten Island [2]	1% from 2011 to 2016, and 0.5% from 2016 to 2017	

[1] Route 440 background growth was applied at a point mid-span in the Bayonne Bridge. These growth rates were provided by TB&T.
[2] Background growth in Bayonne and Staten Island apply to all movements within the jurisdiction, including vehicles using the Rt. 440 ramps.

Build Scenario

This scenario represents traffic conditions in 2017 when the project is finalized and all planned roadway improvements are implemented. Levels of service under the Build and the No Build Scenarios are the same. This is the case because there is no difference in the traffic volumes between both scenarios, and the minor design improvements implemented under the Build Scenario do not affect the traffic operational characteristics at the analysis locations.

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) has been redesigned under the Build Scenario, as all eastbound movements are consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

All other roadway improvements were excluded from the analyses since they would not impact the local street network, which is the focus of this study. The most significant roadway improvements are listed below:

1. The existing bridge deck, that currently consists of four travel lanes, measuring 10 feet each, with no shoulders, no median barrier and a 4 foot 9 inches wide pedestrian/bicycle walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders measuring 6 feet 6 inches each, a median barrier, and a 12 foot wide pedestrian/bicycle walkway.
2. The bridge deck would rise by about 60 feet, changing the roadway's vertical alignment
3. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F.

Construction Build Scenarios

Five Construction Build scenarios were evaluated in this study. Each scenario corresponds with a construction stage and would require the extended closure of several roadway segments and / or ramps.

Even though the construction schedule for this project is anticipated to last from 2014 to 2017, it was not known at the time this report was written, exactly when or in what order, each of the construction stages would be implemented. Consequently, a conservative approach was followed as it was assumed that all five stages would be implemented in 2017 to account for the highest possible traffic volumes in each scenario.

For analysis purposes it was assumed that the underpasses of Juliette Street, W. 3rd Street and Gertrude Street would be closed in all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to W. 1st and W. 4th Streets.

Port Authority toll supervising staff currently working in the administration building (by Trantor Place) would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction Build scenarios.

Construction Build Stage 1 Scenario

In this scenario, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via W. 8th Street.

Construction Build Stage 2 Scenario

This scenario is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, woild be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this scenario, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road. This diversion would cause significant operational issues at the intersection of Richmond Terrace with Morningstar Road.

Construction Build Stage 3 Scenario

This scenario is similar to Scenario 2. The only difference is that it would last about eight months, and that ramp E (from northbound Route 440 to J. F. Kennedy Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to J. F. Kennedy Boulevard via northbound Route 440, the southbound 5th Street connection roadway, and westbound 5th Street.

Construction Build Stages 4 and 5 Scenarios

These two construction stages would be very similar and were therefore combined into one for the operational analysis. Construction under this scenario is expected to last about 17 months and would consist of the full closure of Ramp A and Ramp F, as well as the partial closure of Ramp B.

Ramp A's closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F's closure would cause about 70 vehicles per hour to be diverted to Ramp G via W. 8th Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Therefore, due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, with one lane being open to traffic at all times, as is the case today. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B's operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp) and was therefore not included as an analysis location.

Construction Build Scenario for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur when one lane is open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the *2000 Highway Capacity Manual.*

The analysis assumed that under the No Build Scenario, the bridge operates with two lanes per direction and a free flow speed of 50 miles per hour. Under the Construction Build Scenario, the bridge would operate with one lane per direction, and a free flow speed of 40 miles per hour. The analysis results are presented in Chapter 5.

Construction Traffic

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic.

In Stage 2, construction worker trips between their homes, their designated parking areas, and the work site are expected to reach 270 auto trips per day, and construction material deliveries are expected to generate 104 truck trips per day. These trips were assigned to the roadway network via a set of designated routes provided by the PANYNJ.

The highest construction traffic volumes generated in an hour are 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM).

Significant Impact Criteria

The traffic impact criteria proposed for this project encompass some of the "best practices" used in similar large traffic studies in the region that have been accepted by transportation agencies in NYC and NJ. The proposed criteria, reflect criteria used on major transportation improvement projects in New York City, but do not emulate the stringent *NYC CEQR Technical Manual* criteria for significant impacts as they are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude with significant economic benefits to the region.

The following conditions define significant impacts for the purpose of this study:

Significant Impact Criteria for Signalized and Unsignalized Intersections:

- When LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.
- When LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Significant Impact Criteria for Roadway Segments and Ramp Sections:

A highway or ramp section being analyzed—including main line sections, weaving areas, and ramp junctions— are defined to have significant impacts when the following occurs:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse.
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build level of service.

4. REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the proposed closure of the Bayonne Bridge. Two diversion scenarios were evaluated in this study, an Overnight Closure and a Full Weekend Closure. The Overnight diversion scenario consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Friday. The Full Weekend Closure scenario consists of a weekend closure of both directions of the bridge from 9 PM on Friday to Monday 5 AM.

The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). However, the model has the capability of calculating traffic volumes diverted to other roadway segments and intersections in the region.

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are: the 2017 Bayonne Bridge volumes (NY bound and NJ bound), the Origin-Destination (O/D) survey conducted by the PANYNJ in Spring 2003, and the traffic diversion routes developed as part of this study.

Bridge Volumes

The 2017 traffic volumes (hour by hour) for the Bayonne Bridge that were used in the overnight traffic analysis are shown in **Exhibit 4.1**. The table shows the time windows when the bridge would be closed during the Overnight diversion scenario, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by the PANYNJ.

Exhibit 4.1 – 2017 Bayonne Bridge Hourly Volumes – Overnight Closure

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: *1. NY Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.*
2. NJ Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
3. At the Bayonne Bridge, NY Bound is the southbound direction, and NJ Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, Saturday and Sunday). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Exhibit 4.2 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime, Saturday and Sunday time periods and were used in the regional analysis.

Exhibit 4.2 –Weekday AM Trips : Origin/Destination Percentages

Origin \ Destination	#	2	3	4	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
#	Zone	Queens/Long Island	Brooklyn	Manhattan	Union County	NJ South	Staten Island General	Staten Island 10303	Staten Island 10302	Staten Island 10310	Staten Island 10301	Staten Island 10304	Staten Island 10305	Staten Island 10306	Staten Island 10308	Staten Island 10312	Staten Island 10309	Staten Island 10307	Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Exhibit 4.3**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each of which represents a roadway segment. These routes were calculated using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists

mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and its distance, travel time and toll for the AM, Midday, PM and Nighttime periods was calculated. A sample of these routes is shown in **Exhibit 4.4**.

Exhibit 4.3 – Regional Zones

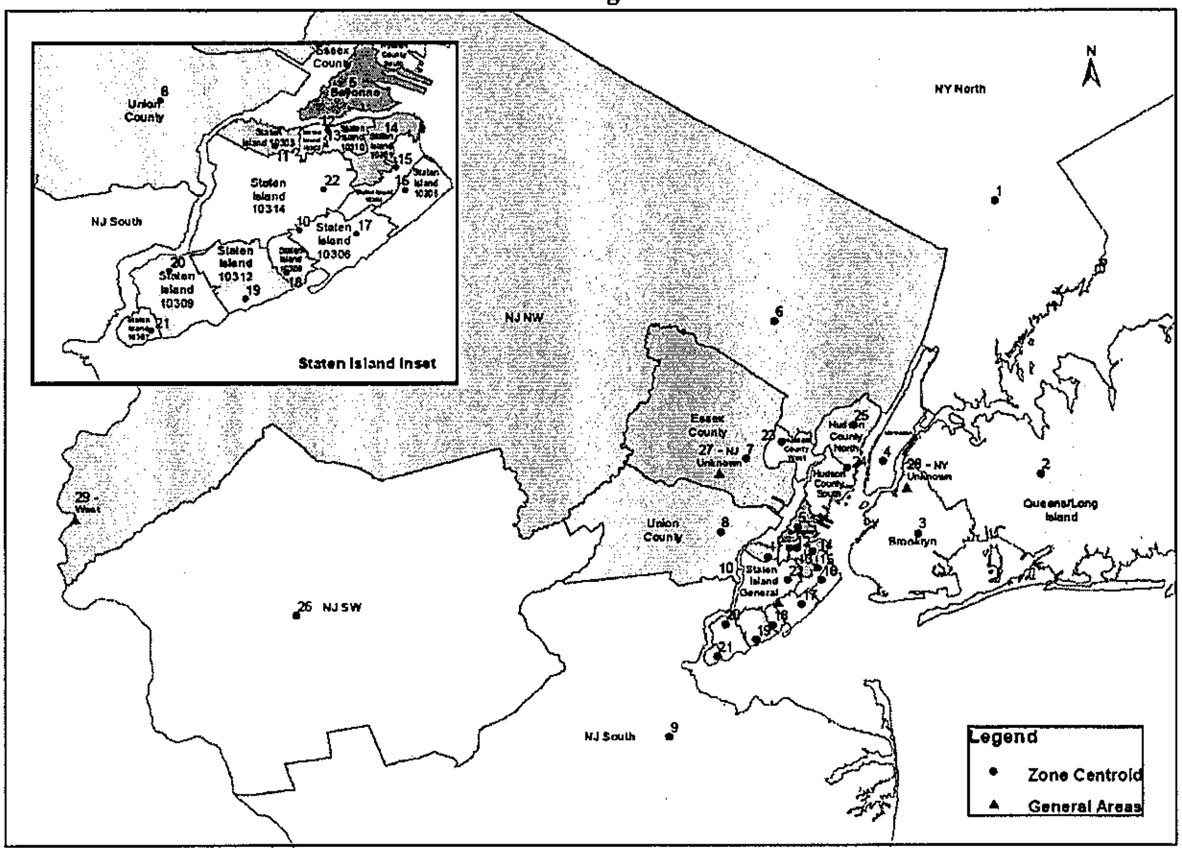


Exhibit 4.4 – Diversion Routes (sample)

Assignment Route		Trip	Trip O/D		Avg. Travel Time by Period (in Minutes)				Distance	Toll
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 11),Outerbridge-EB,Verraz	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB,USTrk1&9-WB,Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB,USTrk1&9-WB,Rt1&9-SB(North of Rt 35),Outerbridge-EB,Verr	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB,NJTPNewarkBay-WB,NJTP-SB(Exit 13),Goethals-EB,Verrazano	NY Bound	1	3	113	72	125	81	58	9.90

Route Selection

A multi-path traffic assignment algorithm developed for this study was applied to each O/D pair, to calculate the number of diverted vehicles using each route. This algorithm was based on a cost function ("cost") calculated for each route, consisting of the sum of the route's distance, toll, and time of day travel time (AM, Midday, PM or Nighttime).

The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs that fall in a range from the minimum cost, to the minimum cost plus a user-defined threshold, in this case equal to 10. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level. This aggregation allowed us to identify the roadway segments impacted the most in the region. **Exhibit 4.5** shows the spreadsheet model results for the key analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Exhibit 4.5 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM) During Overnight Closure

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized spreadsheet was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this spreadsheet, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that gets carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute). Level of service (LOS) was calculated using Exhibit 21-2 of Multilane Analysis from the *Highway Capacity Manual 2000.*

For this analysis, existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using recent existing counts at each facility and queuing information found at the 2010 Annual Report of Interstate Toll Delay prepared by Skycomp, Inc. The existing demand was increased to 2017 by applying the yearly growth rates shown in **Exhibit 4.6.**

Exhibit 4.6 – Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Note: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.

The roadway capacity used in the analysis does not remain constant through the day/s as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway

capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (i.e. EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

5. ANALYSIS FINDINGS

Local Analysis

Traffic operational analyses were conducted for 38 locations where significant traffic impacts were investigated during the AM and PM peak hours. These locations consist of 18 signalized intersections, 17 unsignalized intersections, two roadway segments, and one diverge area. Relevant Measures of Effectiveness (MOEs) calculated under each Construction Build scenario (such as level of service, average vehicular delay, and traffic density), were compared with the No Build Scenario. A total of seven significant traffic impact locations were identified. Mitigation measures were developed for these impacted locations and are discussed in detail in this section. **Exhibit 5.1** shows, amongst all analysis locations, the ones that are significantly impacted, as well as the peak hour and scenarios when the impacts are expected to occur.

Exhibit 5.1 - Locations with Significant Traffic Impacts

	Locations		Construction Stage									
	Int ID	Description	1		2		3		4		5	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
	2	Avenue A and North Street	-	-	✓	✓	✓	✓	-	-	-	-
	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
	4	J.F. Kennedy Boulevard and W. 8th Street	-	-					-	-	-	-
	5	J.F. Kennedy Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
	9	J.F. Kennedy Boulevard and Ramp E					-	-				
	10	J.F. Kennedy Boulevard and W. 4th Street	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11	J.F. Kennedy Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
	12	J.F. Kennedy Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
	16	Route 440 and 5th Street Connection					-	-				
	17	Ingham Avenue and E. 5th Street					-	-				
	43	J.F. Kennedy Boulevard and W. 5th Street					-	-				
	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
	128	J.F. Kennedy Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
	163	J.F. Kennedy Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			✓	✓	✓	✓				
	22	Forest Avenue and Willow Road East			✓	✓	✓	✓				
	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
	23	Forest Avenue and Willow Road West							-	-	-	-
	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
	25	Morningstar Road and St. Adalbert Place							-	-	-	-
	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
	28	Morningstar Road and Innis Street			-	-	-	-				
	29	Morningstar Road and Richmond Terrace			✓	✓	✓	✓				
	30	Richmond Terrace & Newark Avenue			-	-	-	-				
	31	Richmond Terrace and Nicholas Avenue			✓	-	-	-				
	32	Nicholas Avenue and Innis Street			✓	-	-	-				
	33	Trantor Place and Route 440 NB Ramps C and D			✓	-	-	-				
	34	Trantor Place and Walker Street			✓	✓	✓	✓				
	35	Port Richmond Avenue and Walker Street			✓	-	✓	-				
	36	Port Richmond Avenue & Orange Avenue			✓	-	-	-				
	141	Morningstar Road and Newark Avenue			✓	-	-	-				
	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			✓	-	-	-				
	195	Route 440 SB ramp to Willow Road West							-	-	-	-
	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

✓ *Significant Impact*

\- *Location was analyzed, and no traffic impact was identified.*

(blank) *Location was not analyzed.*

Location 2 - Intersection of Avenue A and North Street

A significant traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound J. F. Kennedy Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

This projected impact can be mitigated by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Exhibit** 5.2 shows the average delays and levels of service under the No Build, Construction Build and Mitigated Scenarios for the impacted approach.

Exhibit 5.2 - Significant Impact and Mitigation Results
Avenue A and North Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

[1] Average delay in seconds per vehicle.

Location 10 - Intersection of J. F. Kennedy Boulevard and W. 4th Street

A significant impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, W. 3rd Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be mitigated by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (J. F. Kennedy Boulevard) to the eastbound-westbound phase (W. 4th Street). **Exhibit** 5.3 shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.3 - Significant Impact and Mitigation Results
J. F. Kennedy Blvd and W. 4th St : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

[1] Average delay in seconds per vehicle.

Location 174 - Intersection of Port Richmond Avenue and Van Riper Street

A significant impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be mitigated by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Exhibit 5.4** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.4 - Significant Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street : Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

[1] Average delay in seconds per vehicle.

Location 22 - Intersection of Forest Avenue and Willow Road East

A significant impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating a significant impact that can be mitigated by converting the exclusive right turn lane into a shared through / right lane, and reallocating green time from the mainline through phase to the Willow Road East phase (9 and 3 seconds during the AM and PM peak periods, respectively). Since the northbound approach and receiving lanes at this intersection would be laterally offset under the proposed lane use, lane markings (dotted lines) should be installed through the intersection area to better define the path of vehicles and provide for a safer traffic circulation. **Exhibit 5.5** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.5 - Significant Impact and Mitigation Results
Forest Avenue and Willow Road East : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F	TR	48.5	D
	R	63.0	E	R	63.0	E			
PM	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F	TR	50.2	D
	R	41.3	D	R	41.3	D			

[1] Average delay in seconds per vehicle.

Location 29 - Intersection of Morningstar Road and Richmond Terrace

Under the No Build Scenario, the worst operating conditions at this signalized intersection are projected to occur during the AM peak hour. At this time, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also causes the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation is projected to degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience a significant impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A closure scheme in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This scheme would divert about 200 vehicles per hour to the northbound approach of the intersection causing the level of service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be mitigated by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Exhibit 5.6** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.6 - Significant Impact and Mitigation Results
Morningstar Road and Richmond Terrace : Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

[1] Average delay in seconds per vehicle.

Location 34 - Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Scenario. The closure of Ramp C and eastbound Innis Street in Scenarios 2 and 3, would divert about 400 additional vehicles per hour to this intersection creating a significant impact for the northbound through-right approach. Level of service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, mitigating the significant impact. **Exhibit** 5.7 shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.7 - Significant Impact and Mitigation Results
Trantor Place and Walker Street : Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D

[1] Average delay in seconds per vehicle.

Location 35 – Port Richmond Avenue and Walker Street

A significant traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 100 additional vehicles through this intersection during the peak hour causing the level of service to degrade from LOS D to F.

This impact can be mitigated by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). The mitigation measure would allow the approach to operate at LOS D. **Exhibit 5.8** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Exhibit 5.8 - Significant Impact and Mitigation Results
Port Richmond Avenue and Walker Street : Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D

[1] Average delay in seconds per vehicle.

Exhibit 5.9 shows the seven locations that present a significant impact and a brief description of the proposed mitigation measure.

Exhibit 5.9 – Mitigation Plan

Location		Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Jurisdiction	Proposed Mitigation Measure
ID	Description					
2	Avenue A and North St.	✓			Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	✓			Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		✓		Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	✓	✓		Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			✓	Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	✓	✓		Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	✓			Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

✓ *Significant Impact*

Regional Analysis

Traffic Diversions – Overnight Closure

It is anticipated that the Bayonne Bridge will be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were evaluated in the overnight closure scenario: from Sunday 9 PM to Monday 9 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the proposed hours of closure, the highest hourly volumes at the bridge are expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions, as shown previously in **Exhibit 4.1.**

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Exhibit 5.10.** These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45% of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, and it is expected to occur along the eastbound roadway of the Goethals Bridge, on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Exhibit 5.10 – Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall Percentage
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.10** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 4.1.** This discrepancy occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden, would use Route 1&9 or the New Jersey Turnpike in their new trip.
2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts – Overnight Closure

Exhibit 5.11 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon the overnight closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes. In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Exhibit 5.11 – Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in one Direction	Volume Diverted / Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

[1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this Exhibit represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

Exhibits 5.12 and **5.13** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

The No Build demand represent the vehicular traffic demand expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at level of service LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, the level of service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.12 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114		B		C	
Monday	12 AM to 1 AM	833	79		A		A	
Monday	1 AM to 2 AM	599	54		A		A	
Monday	2 AM to 3 AM	473	44		A		A	
Monday	3 AM to 4 AM	546	41		A		A	
Monday	4 AM to 5 AM	822	61		A		A	
Monday	9 PM to 10 PM	1,686	201		C		C	
Monday	10 PM to 11 PM	1,413	169		B		B	
Monday	11 PM to 12 AM	1,070	130		B		B	
Tuesday	12 AM to 1 AM	833	79		A		A	
Tuesday	1 AM to 2 AM	599	54		A		A	
Tuesday	2 AM to 3 AM	473	44		A		A	
Tuesday	3 AM to 4 AM	546	41		A		A	
Tuesday	4 AM to 5 AM	822	61		A		A	

Exhibit 5.13 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,579	147		B		C	
Sunday	10 PM to 11 PM	1,210	98		B		B	
Sunday	11 PM to 12 AM	784	70		A		A	
Monday	12 AM to 1 AM	382	34		A		A	
Monday	1 AM to 2 AM	302	26		A		A	
Monday	2 AM to 3 AM	271	22		A		A	
Monday	3 AM to 4 AM	298	22		A		A	
Monday	4 AM to 5 AM	517	40		A		A	
Monday	9 PM to 10 PM	1,132	121		B		B	
Monday	10 PM to 11 PM	935	98		A		B	
Monday	11 PM to 12 AM	743	58		A		A	
Tuesday	12 AM to 1 AM	382	34		A		A	
Tuesday	1 AM to 2 AM	302	26		A		A	
Tuesday	2 AM to 3 AM	271	22		A		A	
Tuesday	3 AM to 4 AM	298	22		A		A	
Tuesday	4 AM to 5 AM	517	40		A		A	

Exhibits 5.14 and **5.15** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest and do not require additional attention.

Exhibit 5.14 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40		A		A	
Monday	1 AM to 2 AM	534	28		A		A	
Monday	2 AM to 3 AM	413	22		A		A	
Monday	3 AM to 4 AM	460	21		A		A	
Monday	4 AM to 5 AM	699	33		A		A	
Monday	9 PM to 10 PM	1,862	104		B		C	
Monday	10 PM to 11 PM	1,845	86		C		C	
Monday	11 PM to 12 AM	1,379	67		B		B	
Tuesday	12 AM to 1 AM	835	40		A		A	
Tuesday	1 AM to 2 AM	534	28		A		A	
Tuesday	2 AM to 3 AM	413	22		A		A	
Tuesday	3 AM to 4 AM	460	21		A		A	
Tuesday	4 AM to 5 AM	699	33		A		A	

Exhibit 5.15 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16		B		B	
Monday	1 AM to 2 AM	872	12		A		A	
Monday	2 AM to 3 AM	816	10		A		A	
Monday	3 AM to 4 AM	1,036	10		B		B	
Monday	4 AM to 5 AM	1,528	18		B		B	
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16		B		B	
Tuesday	1 AM to 2 AM	872	12		A		A	
Tuesday	2 AM to 3 AM	816	10		A		A	
Tuesday	3 AM to 4 AM	1,036	10		B		B	
Tuesday	4 AM to 5 AM	1,528	18		B		B	

Exhibits 5.16 and **5.17** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the overnight closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.16 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51		C		C	
Sunday	10 PM to 11 PM	6,029	37		C		C	
Sunday	11 PM to 12 AM	5,751	25		C		C	
Monday	12 AM to 1 AM	3,479	17		B		B	
Monday	1 AM to 2 AM	1,909	12		A		A	
Monday	2 AM to 3 AM	1,078	11		A		A	
Monday	3 AM to 4 AM	933	10		A		A	
Monday	4 AM to 5 AM	949	19		A		A	
Monday	9 PM to 10 PM	4,187	59		B		B	
Monday	10 PM to 11 PM	3,774	47		B		B	
Monday	11 PM to 12 AM	3,729	30		B		B	
Tuesday	12 AM to 1 AM	3,479	17		B		B	
Tuesday	1 AM to 2 AM	1,909	12		A		A	
Tuesday	2 AM to 3 AM	1,078	11		A		A	
Tuesday	3 AM to 4 AM	933	10		A		A	
Tuesday	4 AM to 5 AM	949	19		A		A	

Exhibit 5.17 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71		C		C	
Sunday	10 PM to 11 PM	4,204	56		B		B	
Sunday	11 PM to 12 AM	3,586	39		B		B	
Monday	12 AM to 1 AM	1,959	40		A		A	
Monday	1 AM to 2 AM	1,147	28		A		A	
Monday	2 AM to 3 AM	779	22		A		A	
Monday	3 AM to 4 AM	690	21		A		A	
Monday	4 AM to 5 AM	827	33		A		A	
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	
Monday	10 PM to 11 PM	4,065	86		B		B	
Monday	11 PM to 12 AM	2,967	65		B		B	
Tuesday	12 AM to 1 AM	1,959	40		A		A	
Tuesday	1 AM to 2 AM	1,147	28		A		A	
Tuesday	2 AM to 3 AM	779	22		A		A	
Tuesday	3 AM to 4 AM	690	21		A		A	
Tuesday	4 AM to 5 AM	827	33		A		A	

Exhibits 5.18 and **5.19** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the overnight closure of the Bayonne Bridge as planned.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the level of service is not expected to degrade and no delay increases are expected during closure.

Exhibit 5.18 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10		B		B	
Monday	12 AM to 1 AM	617	1		A		A	
Monday	1 AM to 2 AM	438			A		A	
Monday	2 AM to 3 AM	392			A		A	
Monday	3 AM to 4 AM	446			A		A	
Monday	4 AM to 5 AM	966			A		A	
Monday	9 PM to 10 PM	1,527	4		B		B	
Monday	10 PM to 11 PM	1,207	4		B		B	
Monday	11 PM to 12 AM	887	4		A		A	
Tuesday	12 AM to 1 AM	617	1		A		A	
Tuesday	1 AM to 2 AM	438			A		A	
Tuesday	2 AM to 3 AM	392			A		A	
Tuesday	3 AM to 4 AM	446			A		A	
Tuesday	4 AM to 5 AM	966			A		A	

Exhibit 5.19 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	1,519	12		B		B	
Sunday	10 PM to 11 PM	1,131	8		B		B	
Sunday	11 PM to 12 AM	760	5		A		A	
Monday	12 AM to 1 AM	464			A		A	
Monday	1 AM to 2 AM	347			A		A	
Monday	2 AM to 3 AM	250			A		A	
Monday	3 AM to 4 AM	288			A		A	
Monday	4 AM to 5 AM	350			A		A	
Monday	9 PM to 10 PM	1,619	4		B		C	
Monday	10 PM to 11 PM	1,138	4		B		B	
Monday	11 PM to 12 AM	836			A		A	
Tuesday	12 AM to 1 AM	464			A		A	
Tuesday	1 AM to 2 AM	347			A		A	
Tuesday	2 AM to 3 AM	250			A		A	
Tuesday	3 AM to 4 AM	288			A		A	
Tuesday	4 AM to 5 AM	350			A		A	

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. These delay increases are relatively modest and do not require additional attention.

Exhibit 5.20 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed.

Exhibit 5.20 – Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06
	Westbound					
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63
	Westbound	23.06	E	24.90	E	1.84
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17
	Westbound					

Traffic Diversions – Full Weekend Closure

A second analysis was conducted to evaluate the impacts of a full weekend closure of the Bayonne Bridge. This closure would occur from 9 PM on Friday through Saturday and Sunday to 5 AM Monday during construction. Results below are shown for the closure of Saturday and Sunday, the closure from Sunday to Monday was previously discussed and Friday into Saturday showed no additional increase in delay.

During the full weekend closure, it is expected that Saturday hourly volumes will peak in the NY direction at 5:00 PM to 6:00 PM with an estimated volume of 652 vehicles per hour, while the NJ direction will peak at 1:00 PM to 2:00 PM diverting 487 vehicles per hour. On Sundays, it is anticipated that 612 vehicles per hour will be diverted in the NY direction, peaking at 6:00 PM to 7:00 PM, and 427 vehicles per hour in the NJ direction during the 12:00 PM to 1:00 PM hour. Saturday and Sunday hourly diverted volumes are shown in **Exhibit 5.21**.

Exhibit 5.21 – Bayonne Bridge Weekend Hourly Volumes

Hour	Saturday Volumes		Sunday Volumes	
	NY Bound	NJ Bound	NY Bound	NJ Bound
12 AM to 1 AM	279	111	307	80
1 AM to 2 AM	178	72	176	66
2 AM to 3 AM	142	46	150	37
3 AM to 4 AM	145	43	135	30
4 AM to 5 AM	124	54	110	34
5 AM to 6 AM	146	99	98	50
6 AM to 7 AM	205	173	142	107
7 AM to 8 AM	295	289	197	145
8 AM to 9 AM	371	298	228	180
9 AM to 10 AM	427	330	291	230
10 AM to 11 AM	470	351	374	289
11 AM to 12 PM	497	393	437	352
12 PM to 1 PM	550	483	500	427
1 PM to 2 PM	581	487	530	385
2 PM to 3 PM	647	455	538	382
3 PM to 4 PM	616	468	559	391
4 PM to 5 PM	625	473	551	420
5 PM to 6 PM	652	467	583	388
6 PM to 7 PM	612	446	612	375
7 PM to 8 PM	545	414	530	363
8 PM to 9 PM	464	303	481	293
9 PM to 10 PM	392	281	372	258
10 PM to 11 PM	363	258	298	172
11 PM to 12 AM	335	198	208	121
24-Hr Total	9,661	6,992	8,407	5,575

The percentage of the total diverted traffic using other facilities and the resulting volumes diverted to each facility are shown in **Exhibit 5.22**. These volumes were calculated using the regional spreadsheet diversion model developed for this study.

The weekend diversion model showed that the Goethals Bridge would capture 59 percent of the total traffic diverted to the four facilities. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 37% of this traffic (15 percent and 22 percent, respectively, and the Outerbridge Crossing would capture the remaining four percent

Exhibit 5.22 – Bayonne Bridge Volumes Diverted to Other Facilities (Weekends)

Facility	Saturday			Sunday			Overall Percentage
	Eastbound (5:00 PM - 6:00 PM)	Westbound (1:00 PM - 2:00 PM)	Total	Eastbound (6:00 PM - 7:00 PM)	Westbound (12:00 PM - 1:00 PM)	Total	
Goethals Bridge	386	304	690	419	244	663	59%
Holland Tunnel	115	86	201	47	89	136	15%
Outerbridge Crossing	36	12	48	31	19	50	4%
Verrazano Narrows Bridge	118	120	238	161	98	259	22%
Total	655	522	1177	658	450	1108	100%

It should be noted that the sum of the facility volumes shown in **Exhibit 5.22** do not add up to the volumes diverted from the Bayonne Bridge previously shown in **Exhibit 5.21**. This discrepancy was previously explained in the Overnight closure scenario.

Traffic Impacts – Full Weekend Closure

Exhibits 5.23 and 5.24 show the average traffic delays and levels of service expected on the eastbound and westbound roadways of the Goethals Bridge, with and without the full weekend closure of the Bayonne Bridge.

The No Build demand represents the vehicular traffic demand expected at the Goethals Bridge by 2017 without diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

With the diversions projected, the eastbound roadway of the Goethals Bridge is expected to operate at levels of service E or F from 2:00PM through midnight on Saturdays and from 1:00 PM through midnight on Sundays. As shown in **Exhibits 5.23**, the increase in delays during these periods would range from a low of about 2 minutes, to as much as 41 minutes on Saturdays and 58 minutes on Sundays. For the westbound roadway of the Bridge, with projected diversions, traffic levels of service E or F can be expected from 10:00 AM through 9:00 PM on Saturdays and from 11:00 AM through 9:00 PM on Sundays. As shown in **Exhibits 5.24**, the increase in delays during these periods would range from a low of about 2 minutes to as much as 53 minutes on Saturdays and 34 minutes on Sundays.

Exhibit 5.23 – 2017 Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,273	176		B		B	
	1 AM to 2 AM	826	120		A		A	
	2 AM to 3 AM	607	96		A		A	
	3 AM to 4 AM	518	102		A		A	
	4 AM to 5 AM	560	86		A		A	
	5 AM to 6 AM	819	96		A		A	
	6 AM to 7 AM	1,162	128		B		B	
	7 AM to 8 AM	1,481	180		B		C	
	8 AM to 9 AM	1,780	229		C		C	
	9 AM to 10 AM	2,067	280		C		D	
	10 AM to 11 AM	2,333	316		C		D	
	11 AM to 12 PM	2,678	337		D	0.16	D	0.16
	12 PM to 1 PM	2,638	339		D	0.15	D	0.15
	1 PM to 2 PM	2,597	393		D		D	
	2 PM to 3 PM	2,775	431		D	2.07	E	2.07
	3 PM to 4 PM	2,809	413		D	6.35	E	6.35
	4 PM to 5 PM	3,102	425	1.03	E	13.86	F	12.83
	5 PM to 6 PM	3,072	413	2.77	E	23.98	F	21.21
	6 PM to 7 PM	3,126	415	4.75	E	34.24	F	29.49
	7 PM to 8 PM	2,829	323	4.29	E	41.15	F	36.86
	8 PM to 9 PM	2,674	280	1.29	D	42.20	F	40.91
	9 PM to 10 PM	2,525	234		D	39.33	F	39.33
	10 PM to 11 PM	2,304	219		C	32.15	F	32.15
	11 PM to 12 AM	2,059	204		C	20.01	E	20.01
SUN	12 AM to 1 AM	2,060	189		C		D	
	1 AM to 2 AM	1,391	116		B		B	
	2 AM to 3 AM	863	99		A		A	
	3 AM to 4 AM	638	93		A		A	
	4 AM to 5 AM	459	75		A		A	
	5 AM to 6 AM	574	63		A		A	
	6 AM to 7 AM	872	87		A		A	
	7 AM to 8 AM	1,191	117		B		B	
	8 AM to 9 AM	1,580	138		B		C	
	9 AM to 10 AM	2,146	186		C		C	
	10 AM to 11 AM	2,438	246		D		D	
	11 AM to 12 PM	2,643	288		D		D	
	12 PM to 1 PM	2,637	337		D		D	
	1 PM to 2 PM	2,841	349		D	1.91	E	1.91
	2 PM to 3 PM	2,927	377		D	6.86	E	6.85
	3 PM to 4 PM	3,042	389	0.43	D	14.21	F	13.79
	4 PM to 5 PM	3,226	376	3.11	E	24.55	F	21.44
	5 PM to 6 PM	3,343	403	8.00	E	36.86	F	28.86
	6 PM to 7 PM	3,229	445	13.02	E	50.36	F	37.34
	7 PM to 8 PM	3,156	363	16.99	F	62.78	F	45.79
	8 PM to 9 PM	2,824	326	16.78	E	69.45	F	52.67
	9 PM to 10 PM	2,437	245	9.39	E	67.76	F	58.37
	10 PM to 11 PM	1,926	202	1.88	C	55.86	F	53.98
	11 PM to 12 AM	1,558	132		B	34.04	F	34.04

Exhibit 5.24 – 2017 Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	683	64		A		A	
	1 AM to 2 AM	472	41		A		A	
	2 AM to 3 AM	379	26		A		A	
	3 AM to 4 AM	348	25		A		A	
	4 AM to 5 AM	474	31		A		A	
	5 AM to 6 AM	822	57		A		A	
	6 AM to 7 AM	1,136	99		B		B	
	7 AM to 8 AM	1,677	165		C		C	
	8 AM to 9 AM	2,244	170		C		D	
	9 AM to 10 AM	2,784	189		D	0.07	D	0.07
	10 AM to 11 AM	2,984	201	0.00	D	2.39	E	2.39
	11 AM to 12 PM	3,291	241	2.84	E	10.40	F	7.56
	12 PM to 1 PM	3,445	301	10.13	E	24.35	F	14.23
	1 PM to 2 PM	3,091	304	15.48	F	37.13	F	21.66
	2 PM to 3 PM	2,847	280	14.85	E	43.51	F	28.66
	3 PM to 4 PM	2,960	287	12.92	E	48.20	F	35.27
	4 PM to 5 PM	2,987	291	12.39	E	54.18	F	41.78
	5 PM to 6 PM	2,770	284	9.96	E	58.00	F	48.04
	6 PM to 7 PM	2,482	271	3.83	D	56.42	F	52.59
	7 PM to 8 PM	2,116	237		C	47.81	F	47.81
	8 PM to 9 PM	1,878	173		C	32.16	F	32.16
	9 PM to 10 PM	1,582	161		B	11.41	D	11.41
	10 PM to 11 PM	1,394	147		B		B	
	11 PM to 12 AM	1,252	113		B		B	
SUN	12 AM to 1 AM	583	46		A		A	
	1 AM to 2 AM	393	38		A		A	
	2 AM to 3 AM	255	21		A		A	
	3 AM to 4 AM	202	17		A		A	
	4 AM to 5 AM	225	20		A		A	
	5 AM to 6 AM	302	29		A		A	
	6 AM to 7 AM	708	61		A		A	
	7 AM to 8 AM	1,081	83		B		B	
	8 AM to 9 AM	1,543	103		B		C	
	9 AM to 10 AM	2,190	131		C		D	
	10 AM to 11 AM	2,834	165	0.00	D	0.34	D	0.34
	11 AM to 12 PM	3,048	201	0.49	D	3.60	E	3.11
	12 PM to 1 PM	3,242	244	3.39	E	11.97	F	8.57
	1 PM to 2 PM	3,195	220	7.76	E	22.01	F	14.25
	2 PM to 3 PM	3,092	228	10.63	E	30.26	F	19.63
	3 PM to 4 PM	3,034	238	11.89	E	36.96	F	25.07
	4 PM to 5 PM	2,697	259	9.19	E	39.85	F	30.66
	5 PM to 6 PM	2,434	240	3.08	D	36.60	F	33.52
	6 PM to 7 PM	2,577	232		D	31.74	F	31.74
	7 PM to 8 PM	2,221	223		C	24.57	F	24.57
	8 PM to 9 PM	2,038	179		C	11.49	E	11.49
	9 PM to 10 PM	1,579	154		B	1.91	C	1.91
	10 PM to 11 PM	1,210	102		B		B	
	11 PM to 12 AM	784	68		A		A	

As shown in **Exhibits 5.23** and **5.24** delays are compounded due to the roadway reaching its capacity. This capacity is reached due to the background growth of the facility and the added traffic due to the Bayonne Bridge closure.

Exhibits 5.25 and **5.26** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Holland Tunnel, with and without the weekend closure of the Bayonne Bridge

For the eastbound Tunnel, delays are similar to the Goethals Bridge; however the delays span a larger time period lasting on Saturday from 9:00 AM to 3:00 AM on Sunday, with the largest increase in delay at 12:00 AM on Sunday expecting an additional 45 minute delay per vehicle.

For the westbound Tunnel, delays last from Saturday at 3:00 PM to 4:00 AM on Sunday. Sunday afternoon also experiences similar delays from 3:00 PM to 12:00 AM.

Exhibit 5.25 – 2017 Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,336	75		B		B	
	1 AM to 2 AM	857	51		A		A	
	2 AM to 3 AM	636	41		A		A	
	3 AM to 4 AM	513	43		A		A	
	4 AM to 5 AM	665	37		A		A	
	5 AM to 6 AM	979	41		A		B	
	6 AM to 7 AM	1,607	55		B		C	
	7 AM to 8 AM	1,936	78		C		C	
	8 AM to 9 AM	2,419	98		D		D	
	9 AM to 10 AM	2,747	120	0.52	D	1.86	D	1.33
	10 AM to 11 AM	2,874	135	2.98	D	7.15	E	4.17
	11 AM to 12 PM	3,023	141	8.21	E	15.42	E	7.20
	12 PM to 1 PM	3,120	175	14.30	E	24.72	F	10.41
	1 PM to 2 PM	2,965	162	19.86	E	33.93	F	14.08
	2 PM to 3 PM	2,976	176	25.07	F	43.02	F	17.95
	3 PM to 4 PM	3,125	139	32.48	F	54.05	F	21.57
	4 PM to 5 PM	3,188	123	42.88	F	67.54	F	24.66
	5 PM to 6 PM	2,992	123	51.54	F	78.93	F	27.39
	6 PM to 7 PM	3,118	97	56.50	F	85.60	F	29.11
	7 PM to 8 PM	2,971	139	60.59	F	91.76	F	31.18
	8 PM to 9 PM	2,644	119	63.41	F	98.17	F	34.77
	9 PM to 10 PM	2,346	100	59.91	F	97.67	F	37.76
	10 PM to 11 PM	2,397	94	52.61	F	92.52	F	39.91
	11 PM to 12 AM	2,212	87	43.82	F	85.74	F	41.92
SUN	12 AM to 1 AM	1,640	77	28.82	E	73.88	F	45.06
	1 AM to 2 AM	1,116	47	9.62	C	50.15	F	40.53
	2 AM to 3 AM	818	40		A	16.92	C	16.92
	3 AM to 4 AM	693	38		A		A	
	4 AM to 5 AM	570	31		A		A	
	5 AM to 6 AM	671	26		A		A	
	6 AM to 7 AM	1,049	36		B		B	
	7 AM to 8 AM	1,362	49		B		B	
	8 AM to 9 AM	1,886	57		C		C	
	9 AM to 10 AM	2,600	78	0.59	D	1.51	D	0.92
	10 AM to 11 AM	3,053	102	4.43	E	7.32	E	2.88
	11 AM to 12 PM	3,116	120	10.28	E	15.40	E	5.12
	12 PM to 1 PM	3,466	141	21.10	F	29.09	F	7.99
	1 PM to 2 PM	3,334	145	38.21	F	49.76	F	11.55
	2 PM to 3 PM	2,789	90	46.16	F	60.22	F	14.06
	3 PM to 4 PM	3,032	77	49.28	F	64.97	F	15.69
	4 PM to 5 PM	2,881	84	55.25	F	72.87	F	17.62
	5 PM to 6 PM	3,066	71	60.42	F	79.64	F	19.22
	6 PM to 7 PM	2,816	50	63.43	F	83.69	F	20.26
	7 PM to 8 PM	2,868	68	66.22	F	87.96	F	21.74
	8 PM to 9 PM	2,546	72	71.14	F	95.48	F	24.34
	9 PM to 10 PM	2,129	55	68.11	F	94.59	F	26.48
	10 PM to 11 PM	1,615	45	52.15	F	79.81	F	27.66
	11 PM to 12 AM	1,233	42	25.66	D	54.34	F	28.68

Exhibit 5.26 – 2017 Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,760	28		C		C	
	1 AM to 2 AM	1,366	20		B		B	
	2 AM to 3 AM	1,310	13		B		B	
	3 AM to 4 AM	1,239	12		B		B	
	4 AM to 5 AM	1,447	15		B		B	
	5 AM to 6 AM	1,685	26		C		C	
	6 AM to 7 AM	2,168	44		C		C	
	7 AM to 8 AM	2,541	71		D		D	
	8 AM to 9 AM	2,868	75	2.69	D	3.55	D	0.86
	9 AM to 10 AM	3,271	88	12.26	E	14.96	E	2.70
	10 AM to 11 AM	3,372	96	25.70	F	30.37	F	4.67
	11 AM to 12 PM	3,462	88	40.70	F	47.37	F	6.67
	12 PM to 1 PM	2,934	107	52.23	F	61.14	F	8.92
	1 PM to 2 PM	2,927 '	104	57.71	F	68.99	F	11.28
	2 PM to 3 PM	2,950	96	62.35	F	75.77	F	13.42
	3 PM to 4 PM	2,955	94	67.10	F	82.54	F	15.45
	4 PM to 5 PM	2,955	93	72.08	F	89.57	F	17.49
	5 PM to 6 PM	2,843	91	75.58	F	95.05	F	19.47
	6 PM to 7 PM	2,728	87	79.20	F	101.03	F	21.83
	7 PM to 8 PM	2,661	100	82.17	F	106.54	F	24.37
	8 PM to 9 PM	2,586	74	81.98	F	108.33	F	26.35
	9 PM to 10 PM	2,555	68	80.57	F	108.54	F	27.97
	10 PM to 11 PM	2,453	63	77.66	F	107.12	F	29.46
	11 PM to 12 AM	2,163	49	70.27	F	101.01	F	30.74
SUN	12 AM to 1 AM	1,788	19	55.30	F	86.82	F	31.52
	1 AM to 2 AM	1,562	17	33.49	E	65.41	F	31.93
	2 AM to 3 AM	1,507	9	10.65	D	40.69	F	30.05
	3 AM to 4 AM	1,374	8		B	13.99	D	13.99
	4 AM to 5 AM	1,159	9		B		B	
	5 AM to 6 AM	1,321	12		B		B	
	6 AM to 7 AM	1,661	25		C		C	
	7 AM to 8 AM	2,254	33		C		C	
	8 AM to 9 AM	2,726	42	1.07	D	1.55	D	0.48
	9 AM to 10 AM	3,127	56	7.79	E	9.39	E	1.60
	10 AM to 11 AM	3,524	73	21.68	F	24.67	F	2.99
	11 AM to 12 PM	3,416	89	38.14	F	42.90	F	4.76
	12 PM to 1 PM	2,892	110	47.76	F	54.71	F	6.95
	1 PM to 2 PM	2,841	97	52.28	F	61.64	F	9.36
	2 PM to 3 PM	2,911	79	57.01	F	68.37	F	11.36
	3 PM to 4 PM	3,023	73	61.83	F	74.72	F	12.88
	4 PM to 5 PM	3,003	76	66.98	F	81.34	F	14.36
	5 PM to 6 PM	2,913	68	71.94	F	87.92	F	15.98
	6 PM to 7 PM	2,810	67	77.35	F	95.17	F	17.81
	7 PM to 8 PM	2,816	65	82.26	F	101.82	F	19.56
	8 PM to 9 PM	2,096	54	78.67	F	99.69	F	21.02
	9 PM to 10 PM	1,745	51	62.45	F	84.67	F	22.22
	10 PM to 11 PM	1,734	34	42.10	F	65.29	F	23.18
	11 PM to 12 AM	1,008	28	15.93	D	37.25	E	21.31

Exhibits 5.27 and **5.28** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the weekend closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the level of service is not expected to degrade and minimal delay increases are expected during weekend closures.

Exhibit 5.27 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	2,514	27		A		A	
	1 AM to 2 AM	1,759	19		A		A	
	2 AM to 3 AM	1,354	13		A		A	
	3 AM to 4 AM	1,387	14		A		A	
	4 AM to 5 AM	1,678	14		A		A	
	5 AM to 6 AM	2,945	21		B		B	
	6 AM to 7 AM	4,206	33		B		B	
	7 AM to 8 AM	4,863	52		C		C	
	8 AM to 9 AM	5,387	57		C		C	
	9 AM to 10 AM	5,597	67		C		C	
	10 AM to 11 AM	6,088	74		C		C	
	11 AM to 12 PM	6,440	82		C		C	
	12 PM to 1 PM	6,956	96		C		D	
	1 PM to 2 PM	6,619	102		C		C	
	2 PM to 3 PM	5,720	99		C		C	
	3 PM to 4 PM	5,682	117		C		C	
	4 PM to 5 PM	5,696	129		C		C	
	5 PM to 6 PM	5,091	126		C		C	
	6 PM to 7 PM	5,247	136		C		C	
	7 PM to 8 PM	5,897	77		C		C	
	8 PM to 9 PM	5,803	60		C		C	
	9 PM to 10 PM	5,599	53		C		C	
	10 PM to 11 PM	5,634	50		C		C	
	11 PM to 12 AM	5,374	41		C		C	
SUN	12 AM to 1 AM	4,009	26		B		B	
	1 AM to 2 AM	2,499	19		A		A	
	2 AM to 3 AM	1,629	13		A		A	
	3 AM to 4 AM	1,317	12		A		A	
	4 AM to 5 AM	1,298	11		A		A	
	5 AM to 6 AM	1,713	13		A		A	
	6 AM to 7 AM	2,484	23		A		A	
	7 AM to 8 AM	3,141	31		B		B	
	8 AM to 9 AM	3,692	38		B		B	
	9 AM to 10 AM	4,733	52		B		B	
	10 AM to 11 AM	5,762	67		C		C	
	11 AM to 12 PM	7,035	82		D		D	
	12 PM to 1 PM	7,342	100		D		D	
	1 PM to 2 PM	5,983	91		C		C	
	2 PM to 3 PM	5,939	137		C		C	
	3 PM to 4 PM	5,921	147		C		C	
	4 PM to 5 PM	5,857	137		C		C	
	5 PM to 6 PM	5,857	144		C		C	
	6 PM to 7 PM	5,818	171		C		C	
	7 PM to 8 PM	5,730	131		C		C	
	8 PM to 9 PM	5,529	105		C		C	
	9 PM to 10 PM	5,138	86		C		C	
	10 PM to 11 PM	5,235	64		C		C	
	11 PM to 12 AM	5,435	35		C		C	

Exhibit 5.28 – 2017 Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	3,896	48		B		B	
	1 AM to 2 AM	2,591	33		A		A	
	2 AM to 3 AM	1,870	26		A		A	
	3 AM to 4 AM	1,571	27		A		A	
	4 AM to 5 AM	1,432	24		A		A	
	5 AM to 6 AM	1,354	28		A		A	
	6 AM to 7 AM	1,786	39		A		A	
	7 AM to 8 AM	2,562	57		A		A	
	8 AM to 9 AM	3,470	69		B		B	
	9 AM to 10 AM	4,163	84		B		B	
	10 AM to 11 AM	5,091	94		C		C	
	11 AM to 12 PM	5,938	119		C		C	
	12 PM to 1 PM	6,713	154		C		C	
	1 PM to 2 PM	6,902	145		C		D	
	2 PM to 3 PM	6,366	149		C		C	
	3 PM to 4 PM	6,100	139		C		C	
	4 PM to 5 PM	6,040	136		C		C	
	5 PM to 6 PM	5,693	131		C		C	
	6 PM to 7 PM	5,720	123		C		C	
	7 PM to 8 PM	5,416	97		C		C	
	8 PM to 9 PM	5,399	82		C		C	
	9 PM to 10 PM	5,428	69		C		C	
	10 PM to 11 PM	4,316	65		B		B	
	11 PM to 12 AM	4,118	59		B		B	
SUN	12 AM to 1 AM	2,259	59		A		A	
	1 AM to 2 AM	1,342	38		A		A	
	2 AM to 3 AM	957	31		A		A	
	3 AM to 4 AM	798	29		A		A	
	4 AM to 5 AM	931	24		A		A	
	5 AM to 6 AM	1,821	21		A		A	
	6 AM to 7 AM	3,629	31		B		B	
	7 AM to 8 AM	4,592	41		B		B	
	8 AM to 9 AM	4,940	49		C		C	
	9 AM to 10 AM	4,535	67		B		B	
	10 AM to 11 AM	4,730	87		B		B	
	11 AM to 12 PM	4,693	103		B		B	
	12 PM to 1 PM	5,470	122		C		C	
	1 PM to 2 PM	5,883	123		C		C	
	2 PM to 3 PM	6,705	131		C		C	
	3 PM to 4 PM	7,751	133		D		D	
	4 PM to 5 PM	8,502	131	0.36	D	0.83	D	0.47
	5 PM to 6 PM	8,675	128	1.71	D	3.11	D	1.39
	6 PM to 7 PM	7,615	130	1.35	D	2.27	D	0.93
	7 PM to 8 PM	6,651	117		C		C	
	8 PM to 9 PM	5,835	104		C		C	
	9 PM to 10 PM	4,607	79		B		B	
	10 PM to 11 PM	3,915	61		B		B	
	11 PM to 12 AM	3,325	41		B		B	

Exhibits 5.29 and **5.30** show the traffic delays and levels of service expected on the eastbound and westbound roadways of the Outerbridge Crossing, with and without the weekend closure of the Bayonne Bridge.

For the eastbound roadway, the level of service is not expected to degrade during closure. A modest delay increase of up to a maximum of six minutes is expected on Sundays from 9 PM to 10 PM.

For the westbound roadway, the level of service is not expected to degrade and minimal delay increases, under two minutes, are expected during closure.

Exhibit 5.29 – 2017 Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	1,067	11		B		B	
	1 AM to 2 AM	651	8		A		A	
	2 AM to 3 AM	500	6		A		A	
	3 AM to 4 AM	374	7		A		A	
	4 AM to 5 AM	514	6		A		A	
	5 AM to 6 AM	788	6		A		A	
	6 AM to 7 AM	1,090	8		B		B	
	7 AM to 8 AM	1,448	12		B		B	
	8 AM to 9 AM	1,845	15		C		C	
	9 AM to 10 AM	2,099	18		C		C	
	10 AM to 11 AM	2,341	20		D		D	
	11 AM to 12 PM	2,584	22		D		D	
	12 PM to 1 PM	2,625	50		D		D	
	1 PM to 2 PM	2,777	25		D		D	
	2 PM to 3 PM	2,874	28		D		D	
	3 PM to 4 PM	3,065	28	0.01	D	0.01	D	
	4 PM to 5 PM	3,387	25	1.77	E	2.01	E	0.24
	5 PM to 6 PM	3,408	39	5.48	E	6.31	E	0.84
	6 PM to 7 PM	3,475	24	10.01	F	11.44	F	1.43
	7 PM to 8 PM	3,152	21	12.12	F	13.97	F	1.85
	8 PM to 9 PM	2,848	18	8.36	E	10.58	E	2.21
	9 PM to 10 PM	2,705	15	2.53	D	3.72	E	1.19
	10 PM to 11 PM	2,241	14		C		C	
	11 PM to 12 AM	1,576	13		B		B	
SUN	12 AM to 1 AM	1,250	17		B		B	
	1 AM to 2 AM	780	10		A		A	
	2 AM to 3 AM	521	9		A		A	
	3 AM to 4 AM	336	8		A		A	
	4 AM to 5 AM	285	7		A		A	
	5 AM to 6 AM	364	6		A		A	
	6 AM to 7 AM	464	8		A		A	
	7 AM to 8 AM	529	11		A		A	
	8 AM to 9 AM	738	13		A		A	
	9 AM to 10 AM	1,081	17		B		B	
	10 AM to 11 AM	1,853	22		C		C	
	11 AM to 12 PM	2,708	26		D		D	
	12 PM to 1 PM	3,061	31	0.01	D	0.01	D	
	1 PM to 2 PM	3,279	32	0.76	E	1.06	E	0.30
	2 PM to 3 PM	3,368	53	3.08	E	4.18	E	1.10
	3 PM to 4 PM	3,269	53	5.29	E	7.39	E	2.09
	4 PM to 5 PM	3,372	39	7.56	E	10.51	F	2.96
	5 PM to 6 PM	3,465	32	11.66	F	15.28	F	3.62
	6 PM to 7 PM	3,438	33	16.37	F	20.60	F	4.23
	7 PM to 8 PM	3,406	29	20.53	F	25.35	F	4.81
	8 PM to 9 PM	3,149	27	21.98	F	27.31	F	5.34
	9 PM to 10 PM	2,503	25	14.95	E	20.78	F	5.82
	10 PM to 11 PM	1,785	17	4.21	C	7.24	D	3.03
	11 PM to 12 AM	1,161	12		B		B	

Exhibit 5.30 – 2017 Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
SAT	12 AM to 1 AM	775	5		A		A	
	1 AM to 2 AM	476	3		A		A	
	2 AM to 3 AM	331	2		A		A	
	3 AM to 4 AM	307	2		A		A	
	4 AM to 5 AM	340	2		A		A	
	5 AM to 6 AM	443	4		A		A	
	6 AM to 7 AM	806	7		A		A	
	7 AM to 8 AM	1,366	11		B		B	
	8 AM to 9 AM	2,008	12		C		C	
	9 AM to 10 AM	2,546	14		D		D	
	10 AM to 11 AM	2,776	15		D		D	
	11 AM to 12 PM	3,424	16	2.12	E	2.27	E	0.15
	12 PM to 1 PM	3,485	15	6.90	E	7.34	E	0.44
	1 PM to 2 PM	3,484	15	12.23	F	12.95	F	0.72
	2 PM to 3 PM	3,127	19	14.19	F	15.24	F	1.04
	3 PM to 4 PM	3,198	19	13.49	F	14.89	F	1.40
	4 PM to 5 PM	2,906	19	10.71	E	12.46	E	1.75
	5 PM to 6 PM	2,784	18	4.05	E	6.15	E	2.10
	6 PM to 7 PM	2,493	17	0.08	D	1.21	D	1.13
	7 PM to 8 PM	2,358	16		D		D	
	8 PM to 9 PM	2,166	12		C		C	
	9 PM to 10 PM	2,025	11		C		C	
	10 PM to 11 PM	1,816	10		C		C	
	11 PM to 12 AM	1,404	8		B		B	
SUN	12 AM to 1 AM	581	4		A		A	
	1 AM to 2 AM	372	4		A		A	
	2 AM to 3 AM	226	2		A		A	
	3 AM to 4 AM	155	2		A		A	
	4 AM to 5 AM	165	2		A		A	
	5 AM to 6 AM	190	3		A		A	
	6 AM to 7 AM	418	5		A		A	
	7 AM to 8 AM	788	7		A		A	
	8 AM to 9 AM	1,164	9		B		B	
	9 AM to 10 AM	1,822	12		C		C	
	10 AM to 11 AM	2,513	16		D		D	
	11 AM to 12 PM	3,108	19	0.01	E	0.01	E	
	12 PM to 1 PM	3,287	24	0.83	E	1.06	E	0.23
	1 PM to 2 PM	3,065	21	0.82	E	1.05	E	0.23
	2 PM to 3 PM	2,724	20		D		D	
	3 PM to 4 PM	2,392	19		D		D	
	4 PM to 5 PM	2,310	17		C		C	
	5 PM to 6 PM	2,183	14		C		C	
	6 PM to 7 PM	2,200	12		C		C	
	7 PM to 8 PM	2,311	13		C		C	
	8 PM to 9 PM	2,062	11		C		C	
	9 PM to 10 PM	1,519	10		B		B	
	10 PM to 11 PM	1,131	8		B		B	
	11 PM to 12 AM	760	6		A		A	

In general, traffic impacts are expected at the Goethals Bridge and Holland Tunnel, which capture most of the traffic diverted from Bayonne Bridge and are the facilities close to capacity.

Exhibit 5.31 and 5.32 provide summaries of the highest delay increases expected at the four regional facilities on a Saturday and Sunday, respectively, should the Bayonne Bridge be closed for a full Weekend.

Exhibit 5.31 – Delays and Level of Service by Regional Facility - Saturday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	1.29	D	42.2	F	40.91
	Westbound	3.83	D	56.42	F	52.59
Holland Tunnel	Eastbound	28.82	E	73.88	F	45.06
	Westbound	55.3	F	86.82	F	31.52
Verrazano Narrows Bridge	Eastbound					
	Westbound					
Outerbridge Crossing	Eastbound	8.36	E	10.58	E	2.21
	Westbound	4.05	E	6.15	E	2.1

Exhibit 5.32 – Delays and Level of Service by Regional Facility – Sunday

Facility	Direction	Without Diversions		With Diversions		Delay Difference (min/veh)
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service	
Goethals Bridge	Eastbound	9.39	E	67.76	F	58.37
	Westbound	3.08	D	36.60	F	33.52
Holland Tunnel	Eastbound	25.66	D	54.34	F	28.68
	Westbound	42.1	F	65.29	F	23.18
Verrazano Narrows Bridge	Eastbound					
	Westbound	1.71	D	3.11	D	1.39
Outerbridge Crossing	Eastbound	14.95	E	20.78	F	5.82
	Westbound	0.83	E	1.06	E	0.23

Bayonne Bridge Roadway Analysis

During the weekdays of the Bayonne Bridge construction, a reduction in the number of bridge lanes from two lanes per direction to one, would cause a degradation of level of service for New York bound traffic from 6 AM to 10 PM. A significant traffic impact would occur from 4 PM to 7 PM as the level of service would deteriorate from LOS B in the No Build Scenario to LOS D and LOS E in the Construction Build Scenario.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and significant traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Exhibit 5.33** shows the level of service analysis results for weekdays.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No significant traffic impacts are expected at any time. **Exhibit 5.34** shows the level of service analysis results for weekends

Exhibit 5.33 – Bayonne Bridge Roadway Level of Service Summary: Weekdays

Hour Beg.	New York Bound: 2017 Traffic Volume	NY No Build: Density (pc/mi/ln)	NY No Build: Level of Service	NY Const. Build: Density (pc/mi/ln)	NY Const. Build: Level of Service	NY Delay (min)	NY Significant Impact ?	New Jersey Bound: 2017 Traffic Volume	NJ No Build: Density (pc/mi/ln)	NJ No Build: Level of Service	NJ Const. Build: Density (pc/mi/ln)	NJ Const. Build: Level of Service	NJ Delay (min)	NJ Significant Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).

The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.

Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.

The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.

Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

Exhibit 5.34 – Bayonne Bridge Roadway Level of Service Summary: Weekends

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Significant Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes: Traffic volumes are expressed in passenger car equivalents (PCE).
The conversion to passenger car equivalent is based on a separate study on PA facilities, 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
The free flow speed assumed under the No Build Scenario is 50 mph. The free flow speed assumed under the Construction Build Scenario is 40 mph.
Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build scenario.

The significant traffic impacts identified at the Bayonne Bridge roadway could be partially mitigated, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel through the two mile long work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

6. CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, under Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, under Construction Stages 2 and 3
- Intersection of Route 440 with 5th Street Connector Road, under Construction Stage 3
- Intersection of Ingham Avenue and E. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 5th Street, under Construction Stage 3
- Intersection of J. F. Kennedy Boulevard and W. 4th Street, under all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, under Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, under Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, under Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour under Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Local Impacts and Mitigation

A total of seven significant traffic impact locations were identified. Mitigation measures developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in the table below.

Significant Impact Locations and Mitigation Measures

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	✓		
JFK Blvd. and W 4th Street	Bayonne	✓		
Port Richmond Ave. and Van Riper Street	Staten Island		✓	
Forest Ave. and Willow Road East	Staten Island	✓	✓	
Morningstar Rd. and Richmond Terrace	Staten Island			✓
Trantor Pl. and Walker Street	Staten Island	✓	✓	
Port Richmond Ave. and Walker Street	Staten Island	✓		

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street are proposed to be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. Allowing traffic circulation in the opposite direction along these streets, would cause a major impact to the above mentioned intersection that would otherwise require major reconstruction to mitigate the impact.

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a relatively modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings for the Overnight closure scenario. During this scenario the greatest delay increase of less than three minutes is expected to occur on the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with two minutes each. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than a half-minute, as shown in the tables below. These delay increases are relatively modest and do not require additional traffic improvement consideration.

Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Overnight Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

A full weekend closure of the Bayonne Bridge would cause major delays at the Goethals Bridge and the Holland Tunnel. In general, there would be an increase in delays of up to 58 minutes at the Goethals Bridge and a maximum of 45 minutes at the Holland Tunnel. These delays are due to capacity shortfalls over multiple hours, not one particular hour. All other regional roadway segments evaluated in this scenario are expected to experience a delay increase of less than six minutes, as shown in the table below.

Full Weekend Closure – Maximum Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)	
		Saturday	Sunday
Goethals Bridge	Eastbound	40.91	58.37
	Westbound	52.59	33.52
Holland Tunnel	Eastbound	45.06	28.68
	Westbound	31.52	23.18
Verrazano Narrows Bridge	Eastbound		
	Westbound		1.39
Outerbridge Crossing	Eastbound	2.21	5.82
	Westbound	2.1	0.23

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway is expected to be open to traffic with one lane per direction, instead of the current two lanes per direction, with a significant impact expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create approximately one additional minute of delay to travel through the two-mile long construction zone. In the opposite direction, a significant impact would occur from 7 AM to 9 AM as the roadway would operate at LOS D, and delays through the work zone would also be approximately one minute.

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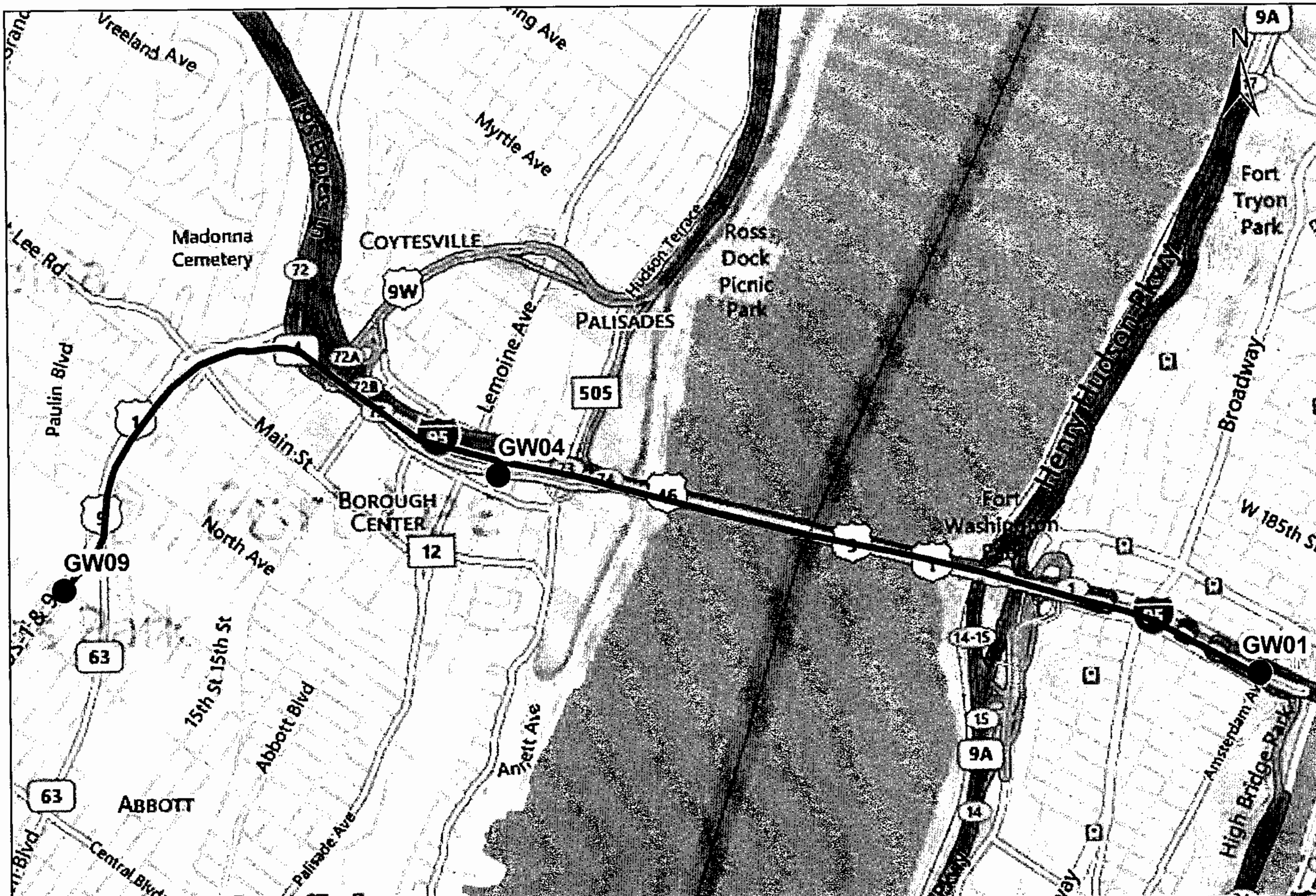
Legend

Reader Locations

Travel Route

PA Traffic Engineering
TRANSMIT Reader Locations
Figure 1 - Trip 9 & 10
GWB EB from I 95 Express and Local Lanes at Jones Rd to Amsterdam Avenue



Legend

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Figure 2 - Trip 11
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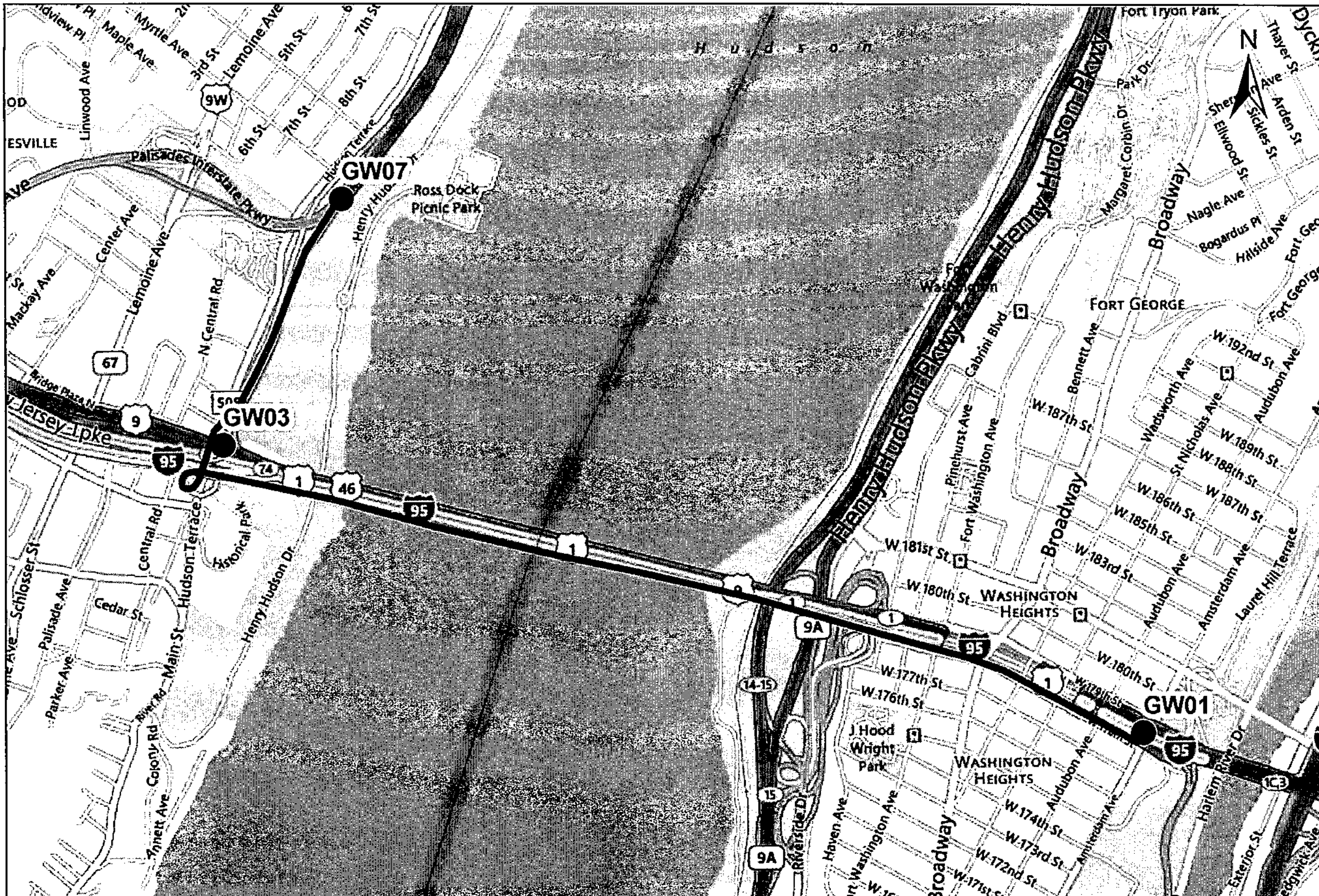

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Figure 3 - Trip 12
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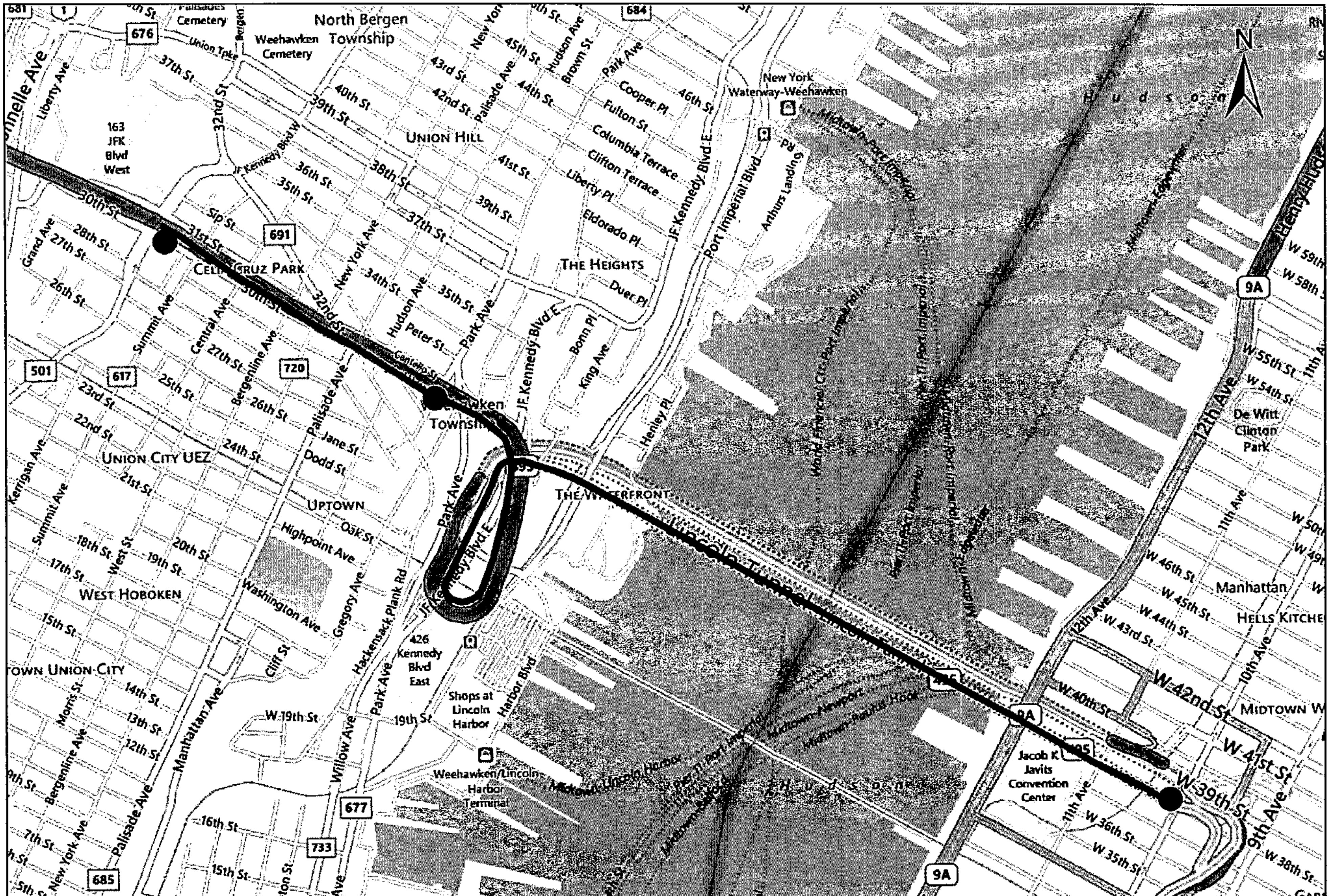

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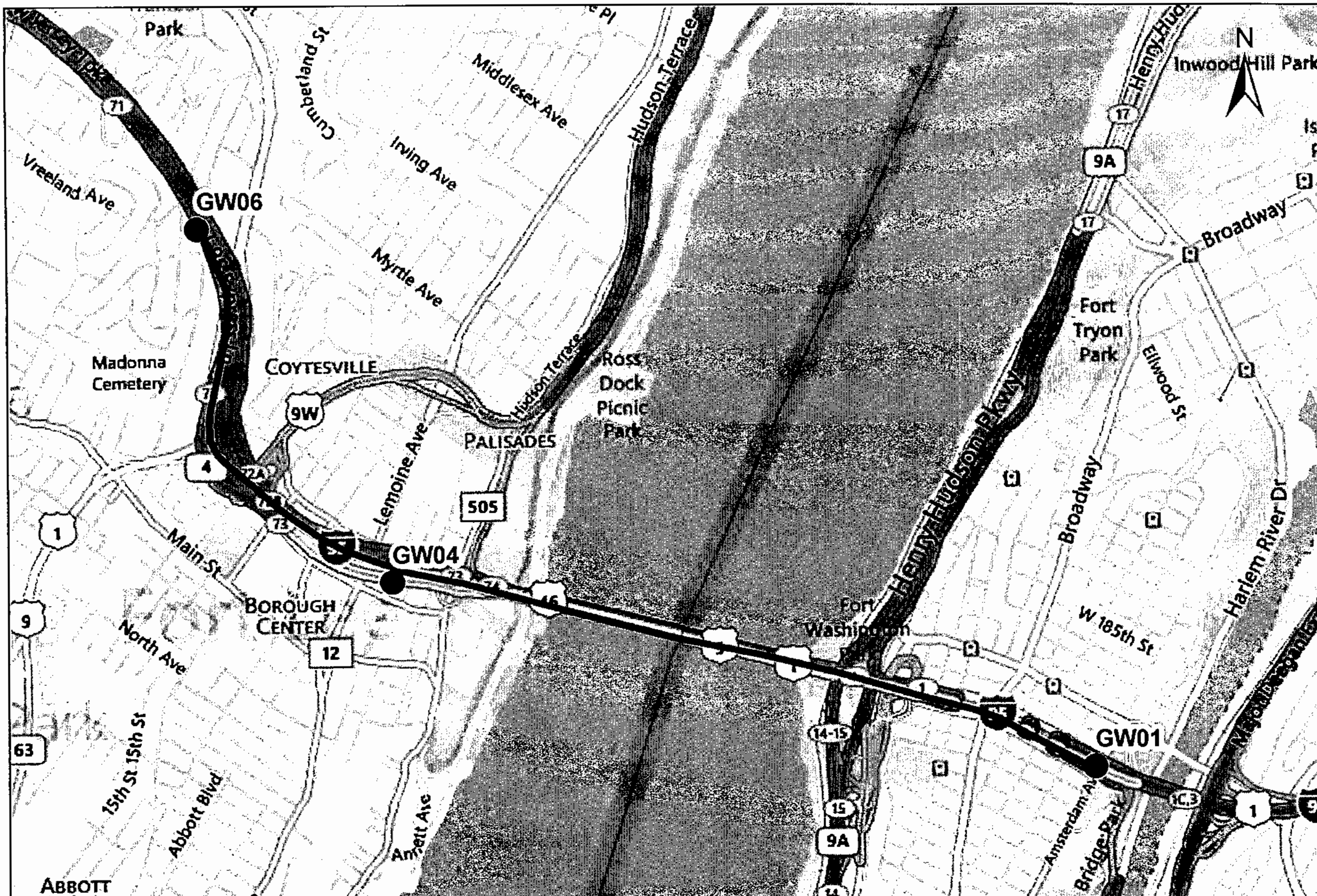

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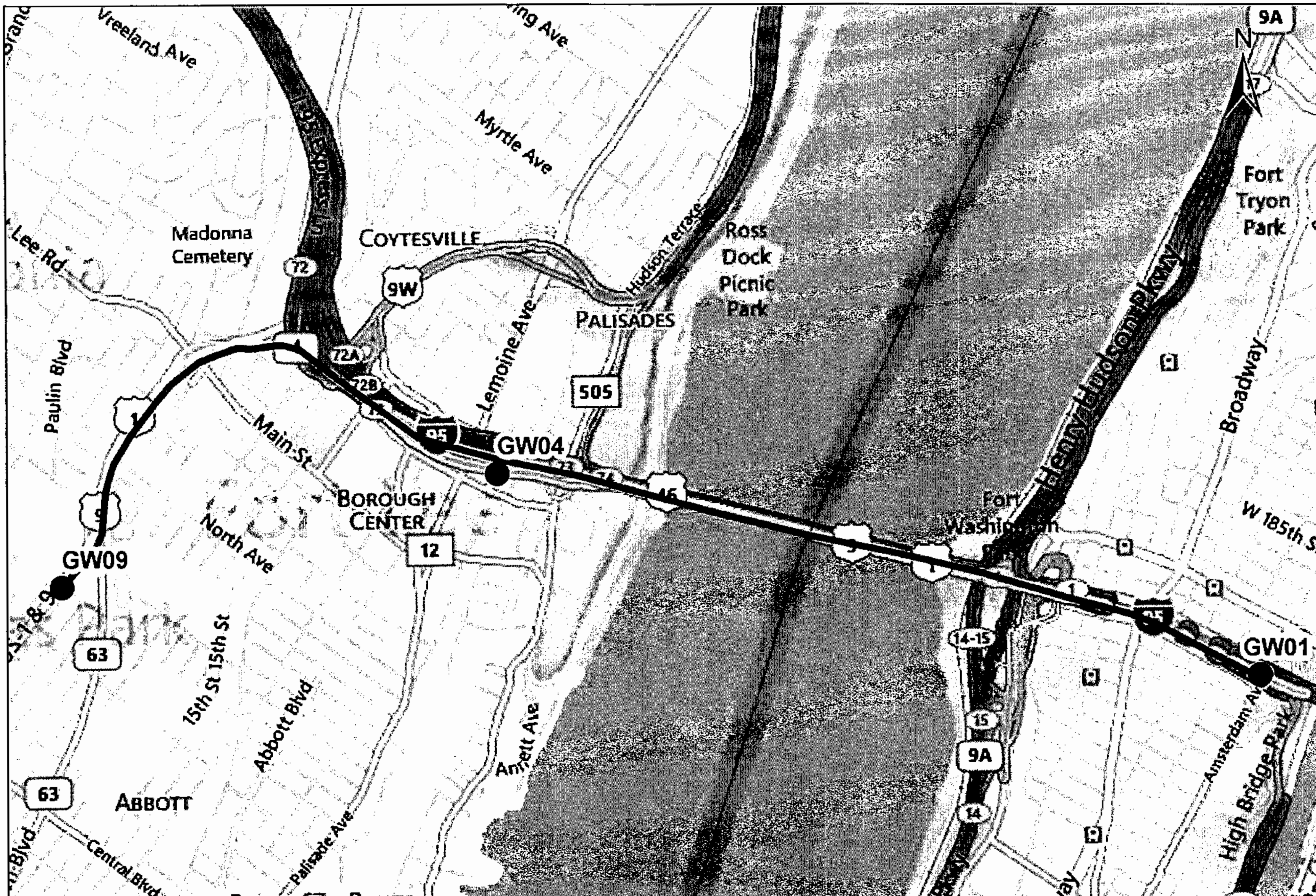
PA - TRAFF - 0007178



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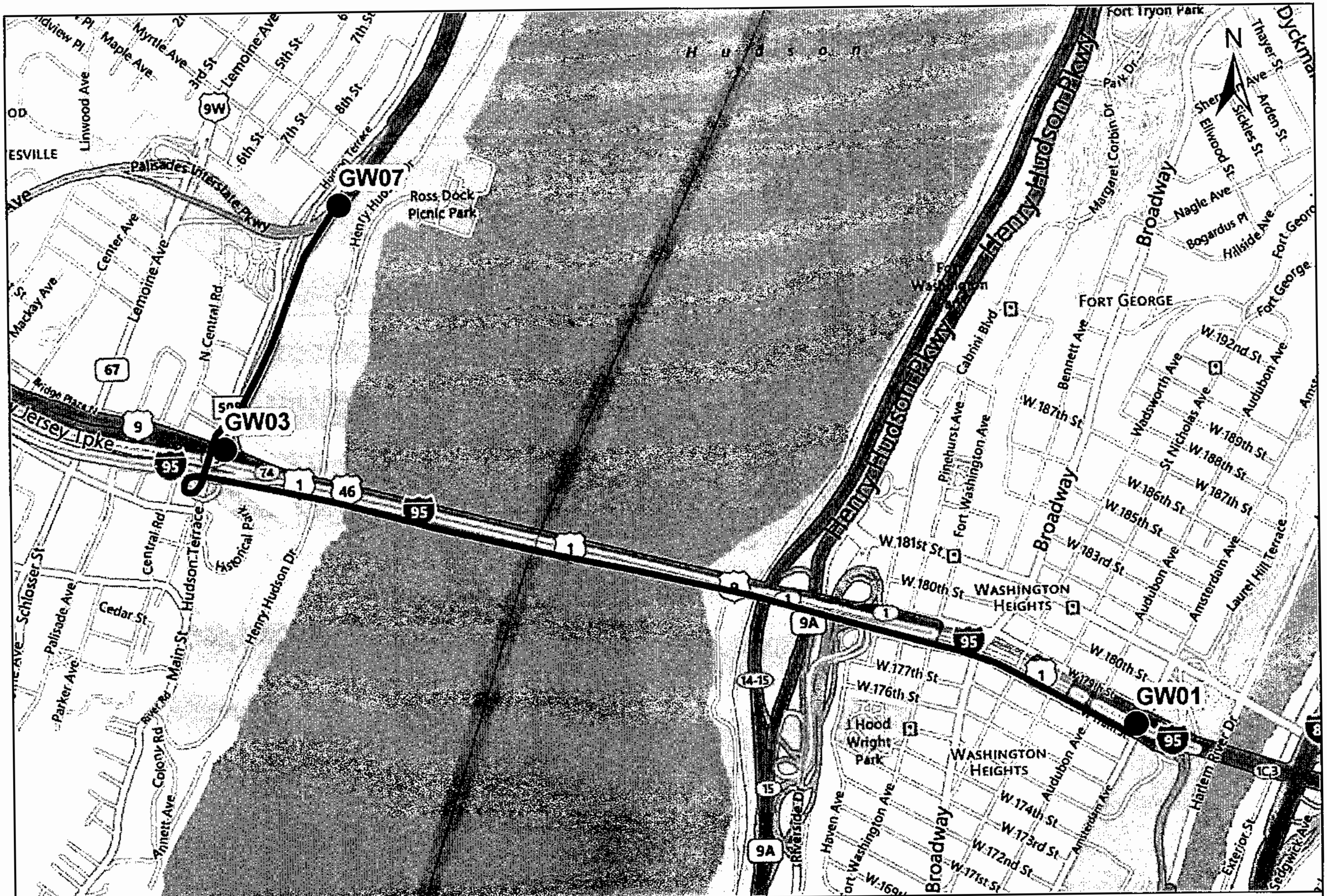
PA - TRAFFIC 0007179



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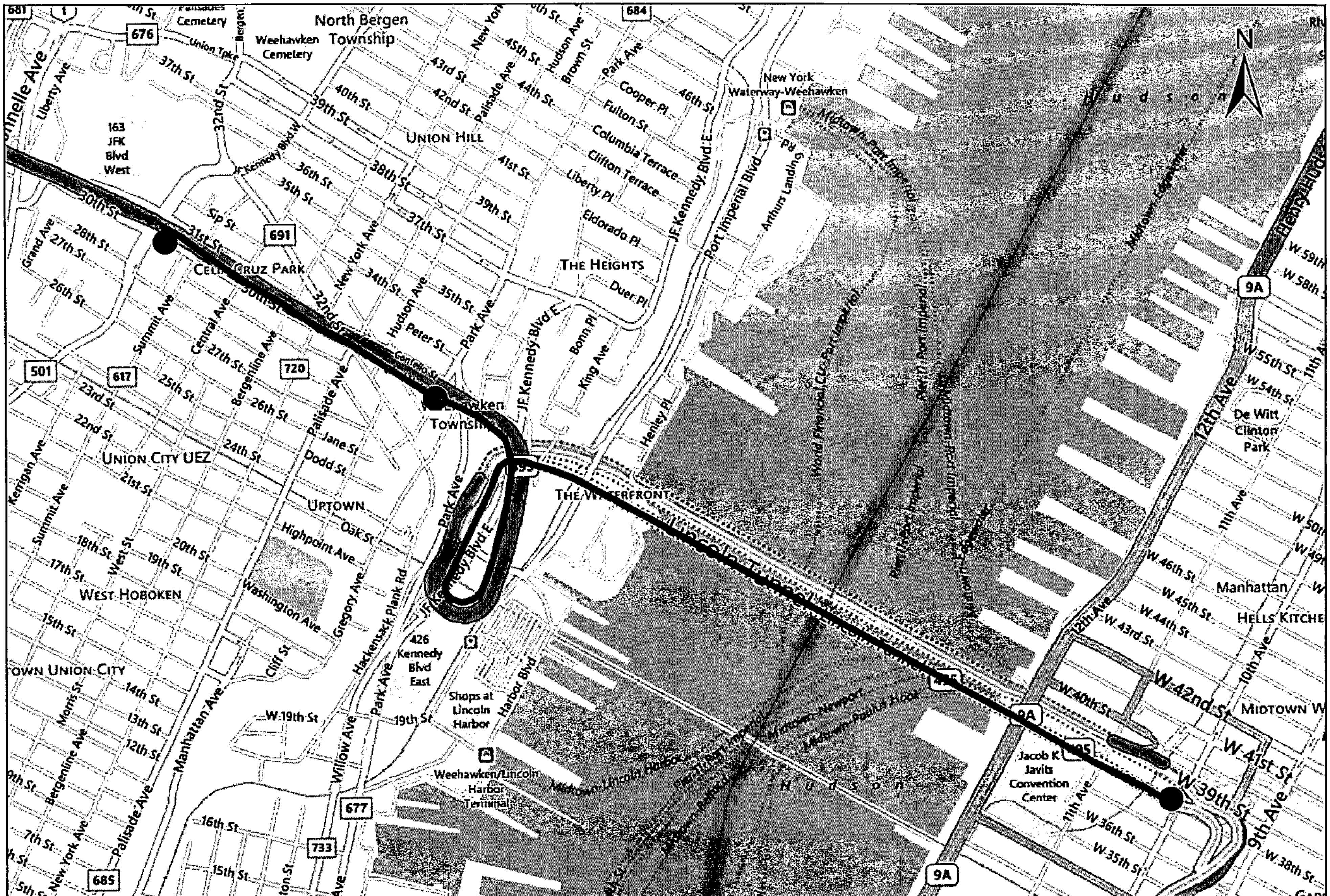
PA-TRAFF-000/160



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Travel time varies inversely with travel speed. **A travel-time study provides data on the amount of time it takes to traverse a section of street or highway. These data, combined with the length of the section under study, produce mean travel speed.** Travel-time and delay studies are conducted when the sources and amounts of delay occurring within the section are also noted. This chapter treats the measurement of delay along a roadway segment. Intersection delay studies are addressed in Chapter 6.

1.1 Applications

Engineers and planners use data from travel-time and delay studies in a number of tasks, including:

- determining the efficiency of a route with respect to its ability to carry traffic relative to other routes through the use of sufficiency ratings or congestion indices;
- system performance measurements;
- providing input to capacity analyses of roadway segments;
- identifying problem locations as indicated by delay;
- evaluating the effectiveness of traffic operation improvements;
- providing input to transportation planning models, trip assignment models and route-diversion models;
- providing input to economic analyses of alternatives;
- generating travel-time contour maps;
- providing input to studies that evaluate trends in efficiency and level of service over time; and
- calibrating and validating simulation models.

1.2 Chapter Overview

Travel-time and delay studies may be conducted using the following methods.

- Test vehicle
- Vehicle observation
- Probe vehicle

The first requires the analyst to perform measurements while in a moving vehicle in the traffic stream, while the others methods do not. The choice of method depends on the purpose of the study; the type of roadway segment under study; the length of the segment; the time of day of interest; and the personnel, equipment and resources available. The most common methods (the test vehicle methods) are presented in detail, whereas the others are described only briefly. Appendix E contains data forms that are suitable for copying.

3.0 OTHER TRAVEL TIME STUDIES

3.1 Vehicle Observation

Vehicle observation methods are technologies that are employed by the study team, which will select which vehicles will be observed, and nonintrusively study them. The license plate, interview and wireless technology methods are part of this group of methods.

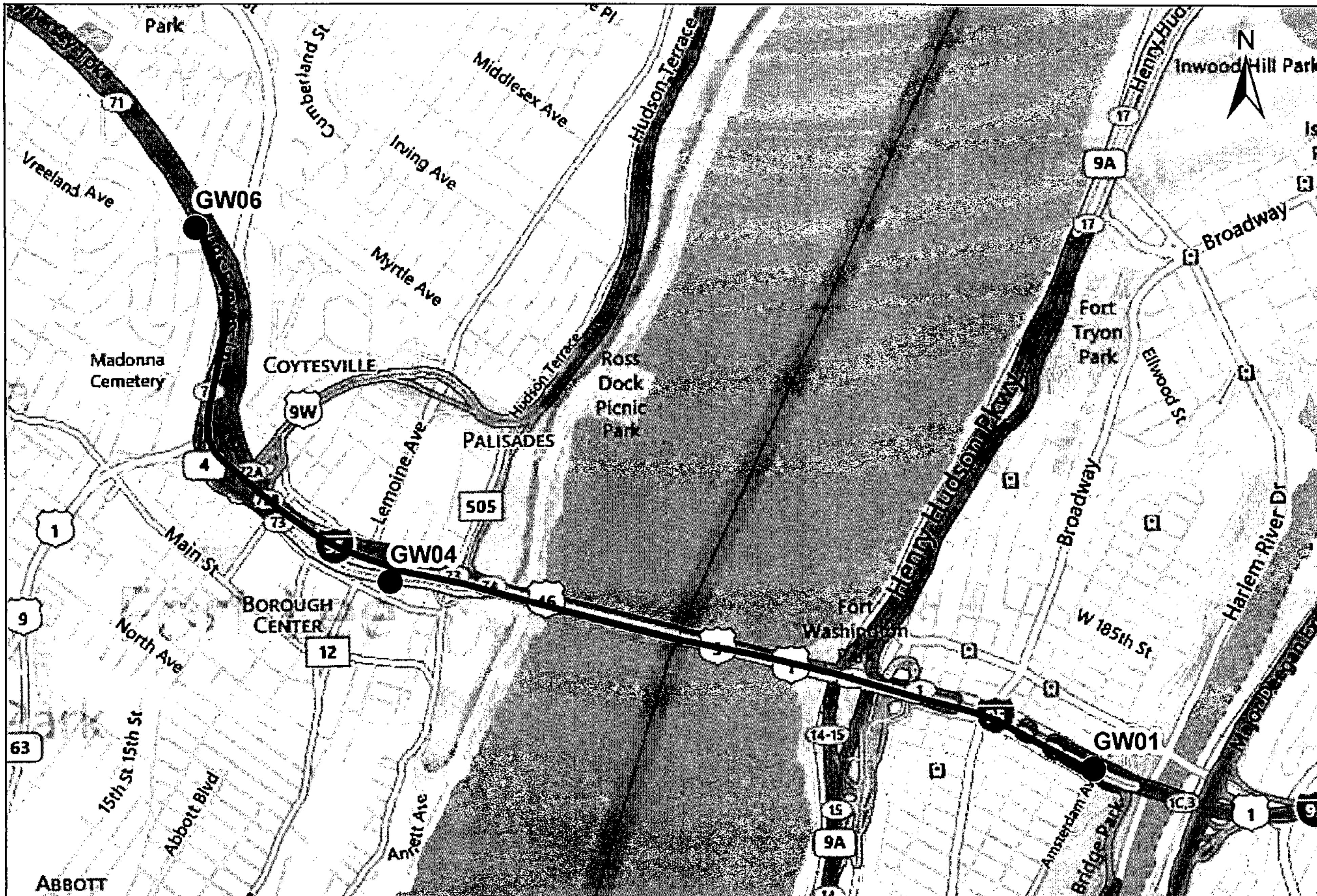
3.1.5 Extrapolation Method

The extrapolation method estimates travel times by applying spot speeds across short segments (Turner, Eisele, Benz and Holdener, 1998). Spot speeds can be collected using a variety of methods including:

- inductance loop detectors;
- piezoelectric sensors;
- active and passive infrared sensors;
- magnetic sensors;
- video tracking and tripline systems;
- doppler microwave;
- passive acoustic sensors; and
- pulse ultrasonic detectors.

The extrapolation method can be used for planning applications, but should be avoided in most studies. Inaccuracies can result from this method due to facility type, detector spacing, traffic flow conditions, or individual device accuracies.

The 2012 Crash Report, attached, is available online at:
http://eol/home/EngineeringTools/TrafficEngineeringInformation/2012CrashReport/tabid/225/Default.aspx

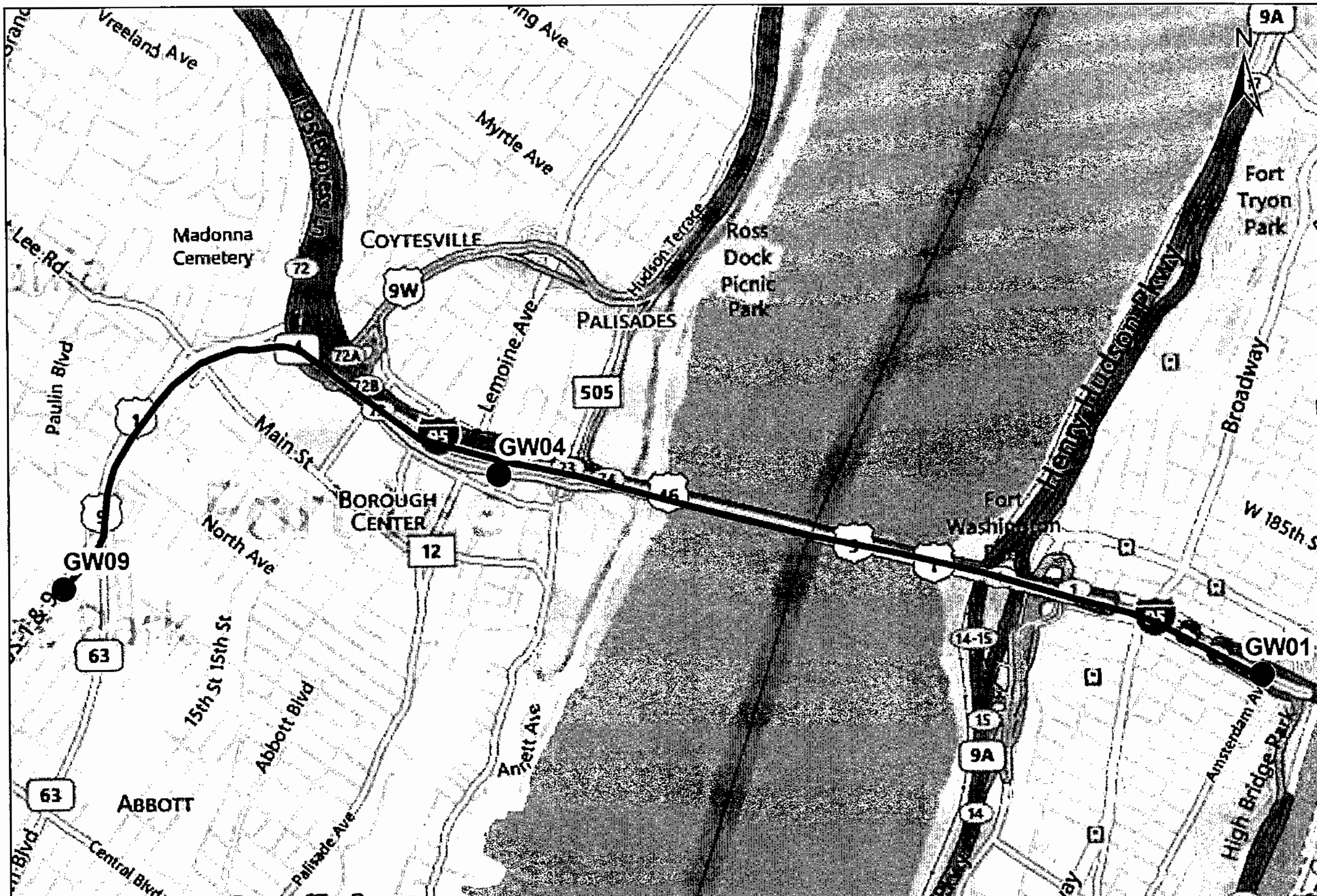


Legend

Reader Locations

Travel Route

PA Traffic Engineering
TRANSMIT Reader Locations
Figure 1 - Trip 9 & 10
GWB EB from I 95 Express and Local Lanes at Jones Rd to Amsterdam Avenue

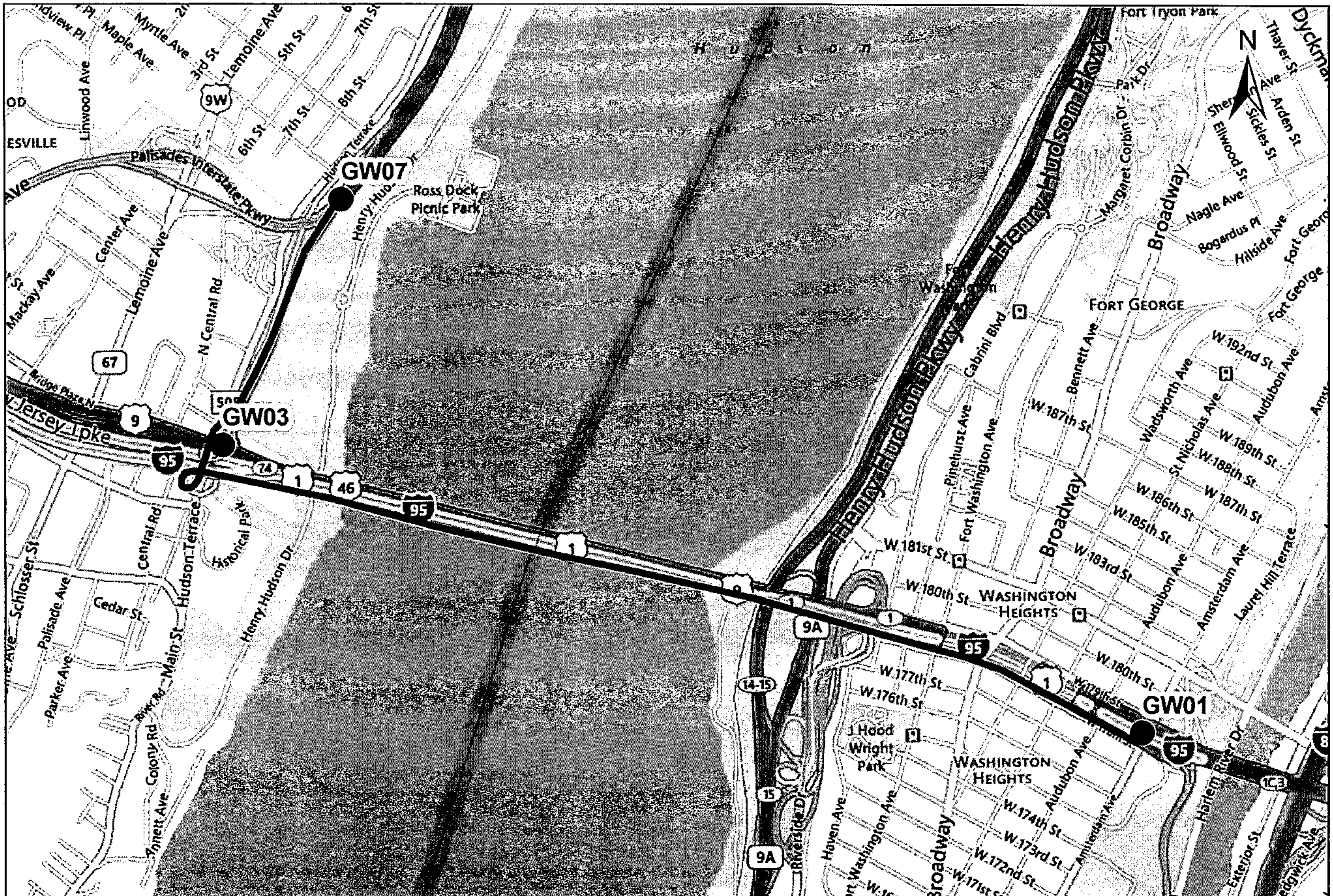


Legend

Reader Locations

Travel Route

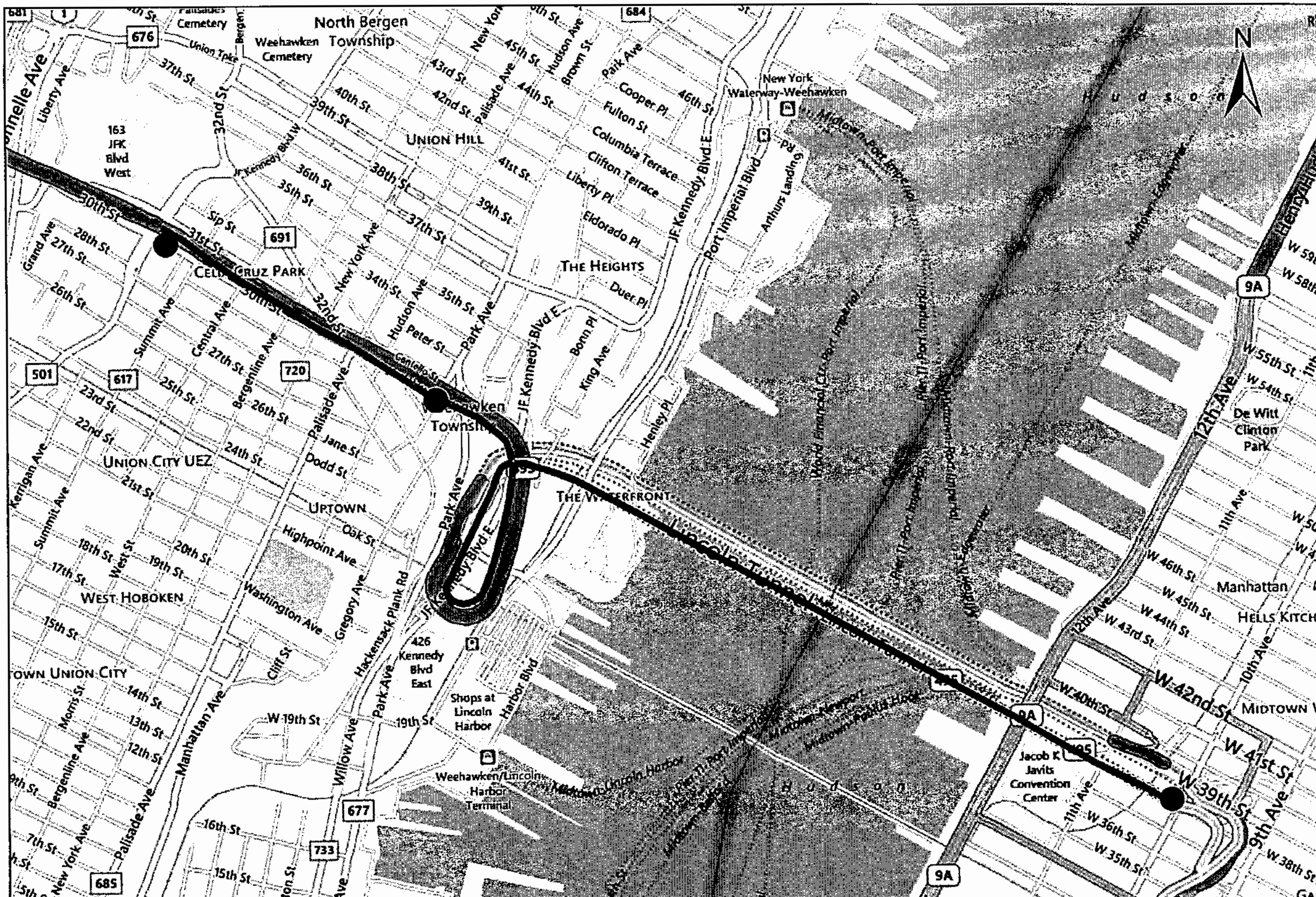
PA Traffic Engineering
TRANSMIT Reader Locations
Figure 2 - Trip 11
GWB EB From Route 46 to GWB E Amsterdam Ave (via upper level)



Legend

- Reader Locations
- Travel Route

PA Traffic Engineering
TRANSMIT Reader Locations
Figure 3 - Trip 12
GWB EB From PIP to Amsterdam Ave (via upper level)



Legend

● Reader Locations

▬ Travel Route

PA Traffic Engineering
TRANSMIT Reader Locations
Figure 4 - Trip 13 & 14
Lincoln Tunnel EB From 495/Kennedy Blvd to Blvd East (Post 6) to NY side

PANYNJ

From: Marsico, Ron
Sent: Tuesday, December 17, 2013 6:08 PM
To: Valens, Chris; Hayes, Anthony; King, Rudolph; Albiez, Cheryl Ann; Pentangelo, Joseph; Shapiro, Evelyn; Rodrigues, Lenis; Van Praagh, Ian
Subject: FW: Port Authority Nightly Media Activity Report 12/17/13

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From:	Simon, Brian
Sent:	Wednesday, December 18, 2013 7:34 PM
To:	Foye, Patrick; MacSpadden, Lisa; Ma, John; Valens, Chris; Garten, David
Subject:	Government & Community Relations Daily Update - 12.18.13

1.TASTE OF NY EVENT AT LGA

The Lt. Governor will participate in a ribbon cutting ceremony for the opening of a Taste of New York store in Terminal C at LaGuardia Airport. The ribbon cutting will take place on Thursday, December 19 at 12 Noon.

2. GEORGE WASHINGTON BRIDGE BUS STATION (GWBBS)

Following up on today's meeting regarding the GWBBS with Washington Heights elected officials, GOCOR is working with TB&T and RES to prepare the Port Authority's agenda and intentions regarding an interagency traffic study. The three departments will meet the first week in January to review similar comprehensive community traffic studies, and to discuss plausible scope and our strategy for working with NYSDOT and NYCDOT. Finally, we are going to schedule a call for you, McBride and Tutor Perini for tomorrow.

GOCOR is also following up with the Washington Heights elected officials who had not been invited to today's meeting by Senator Espaillat. We will ensure that they are aware of the next steps and outcomes from today's meeting, and will keep you apprised of any new information that we learn.

3. RESIDENT PARKING SOLUTION FOR NEWARK AVE. (SI) CONSTRUCTION

GOCOR is working with the Real Estate Department to "rent" parking spaces from a business on Richmond Terrace in Staten Island NY. We will use the property to accommodate residents of Newark Avenue who will have no street parking available after the January 6th traffic change. This change will make Newark Avenue a one way street and eliminate approximately 25 street parking spaces.

UPCOMING PUBLIC MEETINGS/HEARINGS

Thursday, December 19^{th} - LG Bob Duffy- Taste of NY event at LGA

From: Kramer, Marcia G [mgkramer@cbs2ny.com]
Sent: Monday, January 13, 2014 10:11 AM
To: Duffy, Daniel

Daniel Duffy
Port Authority of New York and New jersey

Dear Mr. Duffy:
Under the Freedom of Information laws I would like to request any and all information and correspondence about an alleged traffic study involving the approach lanes from Fort Lee, N.J. to the George Washington Bridge in September 2013.
The data I am seeking includes but is not limit to information and correspondence both before and after the lane closures and any findings and reports that were made as a result of the lane closures.
Looking forward to your reply as soon as possible.
Marcia Kramer
Chief Political Correspondent
WCBS-TV

Marcia Kramer
WCBS-TV
Chief Political Correspondent
mgkramer@cbs2ny.com
917-991-5220 cell
212-975-7372 office

CBS

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From: Ma, John
Sent: Monday, December 09, 2013 5:52 PM
To: Foye, Patrick; MacSpadden, Lisa; Valens, Chris; Garten, David
Subject: Fw: GWB Ft Lee Lane Closure/Diversion presentation
Attachments: Fort Lee Trial Review 2013-0912.ppt

----- Original Message -----
From: Muriello, Mark
Sent: Monday, December 09, 2013 05:43 PM
To: Ma, John
Cc: Fulton, Cedrick; markmuriello :markmuriello
Subject: RE: GWB Ft Lee Lane Closure/Diversion presentation

John -- As requested, attached is the early analysis that we prepared in TB&T to assess the impacts of the GWB Fort Lee lane closures that were put in a s trial in early September. Please keep in mind that this was an early analysis that was not complerted at the time the trial was ended. If you have any questions, please feel free to give me a call at 917-710-5132.

- Mark

From: Ma, John
Sent: Monday, December 09, 2013 4:53 PM
To: Muriello, Mark
Cc: Fulton, Cedrick
Subject: GWB Ft Lee Lane Closure/Diversion presentation

Please send me powerpoint "Early Report" dated Sept 12th prepared for you as soon as possible