TAPPAN ZEE BRIDGE/I-287
ENVIRONMENTAL REVIEW

New York State Department of Transportation
New York State Thruway Authority
Metropolitan Transportation Authority/Metro-North Railroad

Scoping Summary Report

Tappan Zee Bridge/I-287 Corridor Project
Environmental Impact Statement

May 2009

TAPPAN ZEE BRIDGE/I-287
ENVIRONMENTAL REVIEW

SCOPING SUMMARY REPORT

The recommendation on the transit modes, recommendation to replace the Tappan Zee Bridge and the alternatives that will be developed within the DEIS have been accepted

ACCEPTED BY:

Astrid C. Glynn, Commissioner, New York State Department of Transportation — Date: May 7, 2009

Michael R. Fleischer, Executive Director, New York State Thruway Authority — Date: 5/12/09

Howard R. Permut, President, MTA/ Metro-North Railroad — Date: 5/7/09

Brigid Hynes-Cherin, Regional Administrator, Federal Transit Administration — Date: 6/24/09

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Contributed to engineering sections of report.

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Executive Summary

The purpose of the *Scoping Summary Report* is to formally conclude the scoping process conducted in conjunction with the preparation of the Environmental Impact Statement (EIS) for the Tappan Zee Bridge/I-287 Corridor Project located in Rockland and Westchester Counties, New York (NY). The EIS is being prepared by the Project Sponsors - New York State Department of Transportation (NYSDOT), the New York State Thruway Authority (NYSTA), and Metro-North Railroad (an agency of the Metropolitan Transportation Authority [MTA]) - in cooperation with the Federal Partners - Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). It is being prepared in accordance with:

- The National Environmental Policy Act of 1969 (NEPA), as amended, and implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] parts 1500-1508).
- FTA/FHWA NEPA environmental impact regulations as defined in 23 CFR part 771 (*Environmental Impact and Related Procedures*).
- Council on Environmental Quality (CEQ) NEPA environmental impact regulations as defined in 40 CFR 1500-1508.
- FTA/FHWA statewide planning/metropolitan planning regulations as defined in 23 CFR part 450 (*Planning and Assistance Standards*).
- Requirements of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 6002.
- The New York State Environmental Quality Review Act (SEQRA).

The EIS will evaluate multimodal highway and transit alternatives that will address the transportation and mobility needs of the 30-mile Tappan Zee Bridge/I-287 Corridor from Suffern to Port Chester, NY. Additionally, the structural and security needs of the Tappan Zee Bridge will be evaluated, as will other existing highway-improvement needs within the corridor. The EIS will examine existing socioeconomic and environmental conditions within the corridor, evaluate potential impacts of the transportation improvement alternatives (in addition to the No Build Alternative), and will investigate mitigation to address significant adverse impacts. As described below, the EIS will present a tiered analysis of environmental impacts: a transit analysis (Tier 1) and a bridge and highway analysis (Tier 2).

This report provides an overview of the scoping process initiated in 2003. The detailed comments are compiled in the *Scoping Comments Report* (May 2009).

S.1 Environmental Review Process

S.1.1 Notice of Intent

In compliance with NEPA, commencement of the preparation of the EIS was initiated with the publication of a Notice of Intent (NOI) in the Federal Register (Volume 67, No. 246) in December 2002.

Following the publication of the NOI, in accordance with regulations and guidelines developed by CEQ for implementing NEPA, scoping was initiated with a series of public meetings held in January 2003. The scoping process is a key component for development of the Draft EIS (DEIS), and gives the public and agencies the opportunity to comment on the project and the process.

In February 2008, a revised NOI was issued in response to the re-alignment of project management in accordance with SAFETEA-LU Section 6002. One of the major components of SAFETEA-LU Section 6002 provides for the increased opportunity for both the public and federal, state, and local agencies to have active and early involvement in the NEPA process. The public and agencies have the opportunity to comment on the following documents as part of the *Scoping Update Packet* (February 2008):

- Purpose and Need.
- *SAFETEA-LU Section 6002 Coordination Plan*.
- Range of Alternatives and Options.
- DEIS Methodologies.

Furthermore, as a result of the issuance of the revised NOI, subsequent Scoping Update Meetings were held in February 2008 and Public Information Meetings in October 2008.

S.1.2 Tiered Analysis Approach

The Tappan Zee Bridge/I-287 Corridor Project is multimodal, with proposed bridge, highway, and transit improvements. The Project Sponsors, in an effort to expedite the delivery of integrated, multimodal transportation improvements in a way that allows each modal element to advance at its own pace, have decided to prepare the NEPA documentation for this project using a tiered analysis approach. Tiering was authorized as part of FTA/FHWA regulations (23 CFR 771.111(g)) and CEQ regulations (40 CFR 1502.20). Tiering is intended to focus on general matters in a broad statement or analysis with a subsequent focus on a narrower statement or analysis. Tiering has been successfully applied to other projects.

According to the FHWA (http://environment.fhwa.dot.gov/integ/case_missouri.asp), tiering is described as follows:

> *Tiering allows project sponsors to conduct the planning and NEPA activities for large transportation projects in two phases: a Tier 1 Analysis addresses broad, overall corridor issues, such as general location, mode choice and land use impacts and a Tier 2 Analysis focuses on site-specific impacts, costs and mitigation measures. The first tier usually results in a NEPA document with the appropriate level of detail for corridor-level decisions. Second tier studies result in traditional project-level environmental documents.*

The current EIS will include a Tier 1 transit analysis and a Tier 2 bridge and highway analysis as described below. The scope of analysis in each tier will be appropriate to the level of detail necessary to make informed decisions, and will incorporate input received from the public and reviewing agencies. The intent of the Project Sponsors and Federal Partners is for the Tier 1 transit and Tier 2 bridge and highway analyses to be developed concurrently in order to maximize the efficiencies and the potential for multimodal solutions. The two tiers of analysis are:

- **Tier 1 Transit Analysis**: Tier 1 transit analysis is the first step of a two-step process to comply with environmental review under NEPA. The Tier 1 transit analysis will provide a broad

evaluation of planning level alternatives to determine the general effects on the human and natural environment resulting from the mode choices, alignments, locations and termini of facilities and services under consideration in the EIS. In addition, the general locations of suggested station areas will be identified and evaluated. These conceptual, planning level alternatives will be further evaluated in more detail in a future Tier 2 Transit Environmental Process based on more refined engineering design.

- **Tier 2 Bridge and Highway Analysis**: The Tier 2 bridge and highway analysis will evaluate the potential effects of alternative engineering designs for proposed facilities on the human and natural environment. The analysis of alternatives will focus on the potential site specific impacts of the bridge and highway alternatives along the corridor and identify potential mitigation measures. This analysis will incorporate and be consistent with decisions made as part of the Tier 1 transit analysis.

The future Tier 2 Transit Environmental Process will build upon the Tier 1 transit analysis and the Tier 2 bridge and highway analysis. During the future Tier 2 transit environmental analysis, the work completed during the Tier 1 transit analysis will be further refined and decisions advanced based upon more detailed engineering design. The Tier 2 transit analysis will focus in greater detail on specific elements of the transit system such as station locations and site plans, vehicle types, and storage facilities with respect to site specific impacts and mitigation measures.

S.2 Project Context

S.2.1 Project Study Area

The study area consists of a linear 30-mile corridor that extends from the I-87/I-287 Interchange in Rockland County to the I-287/I-95 Interchange in Westchester County and includes the Tappan Zee Bridge. The corridor is an important part of the regional transportation system.

S.2.2 Purpose & Need

The Purpose and Need of this project is to address the transportation safety, mobility, and capacity needs of the Tappan Zee Bridge/I-287 Corridor. Based on input received from stakeholders and the public at the 2003 and 2008 meetings, the Purpose and Need has been clarified to better articulate the transportation needs of the corridor, to clarify the goals and objectives of the project, and to determine if a reasonable alternative is a feasible alternative. The Purpose and Need addresses the problems and deficiencies in the corridor, and clarifies the basis for consideration and selection of optimum solutions to effectively and efficiently deliver the project while respecting the natural and human environment.

Studies conducted for this project have demonstrated that several transportation improvements, including improved mobility, transit options, and safety, are required to meet the growing travel demands of the corridor. The population of Rockland County has more than tripled in the past 50 years, and Westchester County has experienced employment growth in areas around White Plains and the Platinum Mile, a section of I-287 in the Town of Harrison east of White Plains. As a result, travelers in the corridor experience substantial delays due to congestion, as corridor facilities often operate near capacity, particularly in the vicinity of the Tappan Zee Bridge.

The Tappan Zee Bridge and the corridor provide an important link between Rockland and Westchester Counties and to the overall regional transportation network. In addition to the capacity constraints of the corridor, the Tappan Zee Bridge is aging and requires a regular and extensive maintenance program. As the region grows, travel demand will increase on an already strained roadway network. The Project Sponsors recognize that it is not possible to build our way out of congestion in the corridor and that transit will be required as part of the solution.

Based on these considerations, the Project Purpose and Need is to:

- Preserve the river crossing as a vital link in the regional and national transportation network.
- Provide a river crossing that has structural integrity, meets current design criteria and standards, and accommodates transit.
- Improve highway safety, mobility, and capacity throughout the corridor.
- Improve transit mobility and capacity throughout the corridor and travel connections to the existing north-south and east-west transit network.

In order to meet the project needs, five goals have been established to address the bridge, highway, and transit needs of the corridor:

- Improve mobility of people, goods, and services for travel markets served by the Tappan Zee Bridge.
- Maximize the flexibility and adaptability of new transportation infrastructure to accommodate changing long-term demand.
- Maintain and preserve vital elements of the transportation infrastructure.
- Improve the safety and security of the transportation system.
- Avoid, minimize and/or mitigate any significant adverse environmental impacts caused by feasible and prudent improvements.

S.3 Public Participation and Scoping Summary

S.3.1 Public Involvement Process

Since the inception of the project, several goals for achieving the desired comprehensive public involvement have been identified, and they continue to serve as the basis for the public involvement effort. The goals are to:

- Establish effective communication with all stakeholders.
- Educate the public about the environmental review process and the role of government and all stakeholders, including citizens.
- Engage the public in the environmental review process.
- Ensure that the public has the opportunity for input in the development of the alternatives and in the scope of technical analyses.
- Create opportunities to communicate with local communities.
- Inform the public of the progress of the study and of additional opportunities to participate in the process.
- Incorporate the results of the agency and public coordination process into the DEIS.

A comprehensive public participation process has been carried out throughout the study, and has included briefings, meetings, creation of Stakeholder Advisory Working Groups (SAWGs), development of a project Web site, community outreach centers, and Scoping Meetings. Eight sets of major public meetings were held to present information and obtain feedback from the community. Meetings were also held with the following entities:

- Inter-Metropolitan Planning Organization (IMPO).
- Westchester Rockland Tappan Zee Futures Task Force.
- Environmental and Regulatory Agencies.
- County and Local Agencies.
- Stakeholders Committee.
- SAWGs.
- Elected Officials.
- Non-Governmental Organizations.

The public provided input on a variety of factors, including the screening criteria used to assess alternatives/options, the alternatives being studied, and the scope of environmental studies to be conducted.

S.3.2 Scoping Meetings

Three sets of scoping-related meetings were held in Westchester, Rockland, and Orange Counties in 2003 and 2008, which resulted in over 1,300 comments from nearly 500 federal, state and local agencies and elected officials, non-governmental organizations, and members of the general public. All detailed comments and responses to comments are compiled in the *Scoping Comments Report* (May 2009). At each set of meetings, the majority of comments received related to transit modes and transportation issues. However, overall, the comments addressed a wide range of project-related subjects and issues that can generally be grouped into four major areas – transportation, process, river crossing, and environment. Within these major areas, the following six topics emerged as being of particular importance:

- Land Use and Transit-Oriented Development (TOD).
- Environmental Review Process.
- Transit in the Corridor.
- Tappan Zee Bridge.
- Environmental Impacts.
- Highway Improvements.

S.4 Alternatives

S.4.1 Alternatives Analysis Process

In accordance with the environmental review process under NEPA, a variety of alternatives have been developed and considered as part of the scoping process. These alternatives included a wide range of transportation modes and facilities in a variety of locations, configurations and combinations. During scoping, agencies and the public were given an opportunity to comment on the alternatives considered. The process to develop the proposed DEIS alternatives occurred in several steps:

- The Alternatives Analysis (AA) process involved two levels of screening using transportation, environmental, engineering, and cost criteria. All reasonable alternatives were considered and the substantial screening effort that was conducted screened 150 transportation elements down to 72 in Level 1 and those 72 elements were combined to 16 corridor-wide scenarios that were screened down to six alternatives in Level 2.

- In the process of analyzing the six preliminary alternatives, several additional options were developed. Alternatives and options were considered for the river crossing, highway, and transit modes. Evaluation of the river crossing included consideration of type of crossing (bridge or tunnel) and alignment of such facilities. Evaluation of the highway included consideration of general purpose lanes, climbing lanes, high occupancy vehicle (HOV), and high occupancy toll (HOT) lanes. Three transit modes were evaluated: BRT, CRT, and light rail transit (LRT).

- Given the complexity of the project, as well as the project development timeframe, it became necessary to narrow the range of alternatives and options under consideration. Therefore, a third level of screening was initiated in order to identify alternatives for the DEIS. The development of options for the Tappan Zee Bridge was evaluated in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009). Transit mode alternatives and options were evaluated in the *Transit Mode Selection Report* (May 2009). These two reports resulted in a revised set of five alternatives for study in the DEIS.

S.4.2 Alternatives to be Studied in the DEIS

The *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009) determined which bridge options were reasonable alternatives to be carried into the DEIS. Thus, a replacement bridge with single- and dual-level configurations will be studied. Based on the analyses conducted in the *Transit Mode Selection Report* (May 2009), full-corridor BRT from Suffern to Port Chester, and CRT from Suffern with a direct connection to the Hudson Line for service to Grand Central Terminal, will be studied in the DEIS. The project cost estimate for the recommended transportation improvements is $16 billion (in 2012 dollars).

The following five alternatives will be evaluated in the DEIS:

- Alternative A – No Build.
- Alternative B – Full-Corridor Busway and Rockland CRT.
- Alternative C – Busway in Rockland/Bus Lanes in Westchester, and Rockland CRT.
- Alternative D – BRT in HOV/HOT Lanes in Rockland/Busway in Westchester, and Rockland CRT.
- Alternative E – BRT in HOV/HOT Lanes in Rockland /Bus Lanes in Westchester, and Rockland CRT.

Three basic elements, including the nature of CRT service proposed for Rockland County (with a direct connection to the Metro-North Hudson Line in Westchester County); a replacement bridge to carry transit; and highway reconstruction to accommodate transit, are consistent among the four build alternatives. Where the build alternatives differ is in the particular character of the BRT service envisioned for Rockland and Westchester Counties. For each county, two possible implementations of BRT will be evaluated.

S.5 Social, Economic and Environmental Considerations

The DEIS for the Tappan Zee Bridge/I-287 Corridor Project will assess impacts of project alternatives on the affected environment in the corridor. Various federal statutes require analyses of the project's social, economic and environmental consequences, including the Endangered Species Act (ESA), National Historic Preservation Act (NHPA), Clean Air Act (CAA), Clean Water Act (CWA), and Sections 4(f) and 6(f) of the Department of Transportation Act, among others. These analyses will be conducted as part of the NEPA process. A Tier 1 transit analysis will be conducted as part of a broad evaluation of planning level alternatives during the environmental review under NEPA. A Tier 2 bridge and highway analysis will be conducted using appropriate NEPA assessment methodologies to support permit applications for federal and state permits to undertake the selected alternative.

The DEIS will:

- Summarize the results of coordination with federal, state, and local agencies.
- Present the appropriate federal and state regulations and policies.
- Incorporate previous studies.
- Describe the methodology used to assess impacts.
- Identify the affected environment.
- Analyze potential construction-related (short-term) and operational (long-term) impacts (direct, indirect, and cumulative) of the alternatives.
- Identify and analyze opportunities for avoiding, minimizing, and/or mitigating significant impacts.
- Serve as a decision-making tool, and comply with NEPA documentation requirements.

S.6 Next Steps

The closure of the scoping process represents a key milestone in the development of the DEIS for the Tappan Zee Bridge/I-287 Corridor Project. Upcoming milestones include:

- Preparation of the DEIS (May 2009 – August 2010).
- DEIS Public Hearing (October 2010).
- Final Environmental Impact Statement (FEIS) (April 2011).
- Record of Decision (ROD) (June 2011).

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LIST OF ACRONYMS AND ABBREVIATIONS

AA	Alternatives Analysis
AASHTO	American Association of State Highway and Transportation Officials
acc/MVM	Accidents per million vehicle miles
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AGT	Automated Guideway Transit
APE	Area of Potential Effect
ARC	Access to the Region's Core
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARS	Accident Reporting System
ASTM	American Society for Testing Materials
ATR	Automatic Traffic Recorder
BA	Biological Assessment
BM	New York State Department of Transportation Bridge Manual
BPM	Best Practice Model
BRT	Bus Rapid Transit
BTU	British Thermal Unit
CAA	Clean Air Act
CDC	Center for Disease Control
CEQ	Council on Environmental Quality
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CFR	Code of Federal Regulations
CFS	Cubic feet per second
CLASS	Centralized Local Accident Surveillance System (NYSDOT)
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRT	Commuter Rail Transit
CWA	Clean Water Act
CWE	Cross Westchester Expressway
CWP	Central Westchester Parkway
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
dBA	A-weighted Decibel
DEIS	Draft Environmental Impact Statement
DOS	NYS Department of State
EFDC	Environmental Fluid Dynamics Computer Code
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPM	Environmental Procedures Manual (NYSDOT)
ESA	Endangered Species Act

LIST OF ACRONYMS AND ABBREVIATIONS (con't)

ESB	Environmental Science Bureau (NYSDOT)
ETC	Estimated Time of Completion
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FIS	Flood Insurance Studies
FT	Feet
FTA	Federal Transit Administration
GCT	Grand Central Terminal
GPR	Ground Penetrating Radar
GSP	Garden State Parkway
HAR	Highway Advisory Radio
HDM	New York State Department of Transportation Highway Design Manual
HL	Hudson Line
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
HRP	Hutchinson River Parkway
IMPO	Inter-Metropolitan Planning Organization
IRI	International Roughness Index
ITS	Intelligent Transportation Systems
kV	kilovolts
Ldn	Day-Night Sound Level
Leq (1)	Hourly Equivalent Sound Level
LOS	Level of Service
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
MAGLEV	Magnetic Levitation
MEV	Million Entering Vehicles
MOA	Memorandum of Agreement
MPH	Miles per hour
MPO	Metropolitan Planning Organization
MSAT	Mesoscale Priority Mobile Source Air Toxic
MTA	Metropolitan Transportation Authority
MTM	Manual Turning Movement
MVM	Million Vehicle Miles of Travel
NAAQS	National Ambient Air Quality Standards
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NHL	National Historic Landmark

LIST OF ACRONYMS AND ABBREVIATIONS (con't)

NHPA	National Historic Preservation Act
NHS	National Highway System
NJTransit	New Jersey Transit
NMFS	National Marine Fisheries Service
NO_x	Oxides of Nitrogen
NOA	Notice of Availability
NOAA Fisheries	National Oceanographic and Atmospheric Administration – Fisheries
NOI	Notice of Intent
NRE	National Register-Eligible Resource
NYSOPRHP	NYS Office of Parks, Recreation and Historic Preservation
NRL	National Register-Listed Resource
NY	New York
NYC	New York City
NYMTC	New York Metropolitan Transportation Council
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSHPO	New York State Historic Preservation Office
NYSM	New York State Museum
NYSTA	New York State Thruway Authority
O_3	Ozone
O&D	Origin and Destination
OWL	Orange Westchester Link
PDM	Project Development Manual
PIP	Palisades Interstate Parkway
PIPC	Palisades Interstate Park Commission
PJL	Port Jervis Line
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with Diameters up to 2.5 µm
PM_{10}	Particulate Matter with Diameters up to 10 µm
PSHA	Probabilistic Site Hazard Assessment
PVL	Pascack Valley Line
RCNM	Roadway Construction Noise Model
RCRIS	Resource Conservation and Recovery Act Information System
ROD	Record of Decision
ROW	Right-of-way
Rte	Route
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SASS	State Accident Surveillance System (NYSDOT)
SAV	Submerged Aquatic Vegetation
SAWG	Stakeholders' Advisory Working Group

LIST OF ACRONYMS AND ABBREVIATIONS (con't)

SEQRA	State Environmental Quality Review Act
SHPA	(New York) State Historic Preservation Act
SHPO	(New York) State Historic Preservation Office
SOV	Single-Occupancy Vehicle
sq ft	square feet
SWA	Statewide Average
TARA	Threat and Risk Assessment
TCS	Traffic Control System
TDM	Transportation Demand Management
THPO	Tribal Historic Preservation Office
TIP	Transportation Improvement Program
TNM	Transportation Noise Model
TOD	Transit-Oriented Development
TOR	Transit of Rockland
tph	trains per hour
TRANSCOM	US Transportation Command
TRANSMIT	Transcom System for Managing Incidents
TSDM	New York State Thruway Authority Structure Design Manual
TSM	Travel System Management
TZX	Tappan Zee Express
USACE	US Army Corps of Engineers
USBEA	US Bureau of Economic Analysis
USCG	US Coast Guard
USDOT	US Department of Transportation
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VIA	Visual Impacts Assessment
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WPTC	White Plains Transportation Center
WRP	Waterfront Revitalization Plan
WSS	Windshield Sufficiency Score

1 Introduction

The Project Sponsors - New York State Department of Transportation (NYSDOT), the New York State Thruway Authority (NYSTA), and Metro-North Railroad (an agency of the Metropolitan Transportation Authority [MTA]) – in cooperation with the Federal Partners - Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) - are preparing an Environmental Impact Statement (EIS) for the Tappan Zee Bridge/I-287 Corridor in Rockland and Westchester Counties, New York (NY). The EIS is being prepared in accordance with:

- The National Environmental Policy Act of 1969 (NEPA), as amended, and implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] parts 1500-1508).
- FTA/FHWA NEPA environmental impact regulations as defined in 23 CFR part 771 (*Environmental Impact and Related Procedures*).
- Council on Environmental Quality (CEQ) NEPA environmental impact regulations as defined in 40 CFR 1500-1508.
- FTA/FHWA statewide planning/metropolitan planning regulations as defined in 23 CFR part 450 (*Planning and Assistance Standards*).
- Requirements of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 6002.
- The New York State Environmental Quality Review Act (SEQRA).

The purpose of the EIS is to evaluate multimodal highway and transit alternatives that will address the transportation and mobility needs of the 30-mile Tappan Zee Bridge/I-287 Corridor from Suffern to Port Chester, NY. Additionally, the structural and security needs of the Tappan Zee Bridge will be evaluated, as will other existing highway-improvement needs within the corridor. The EIS will examine existing socioeconomic and environmental conditions within the corridor, evaluate potential impacts of the transportation improvement alternatives (in addition to the No Build Alternative), and will investigate mitigation necessary to alleviate these impacts. The EIS will present a tiered analysis of environmental impacts: a Tier 1 transit analysis and a Tier 2 bridge and highway analysis.

A key component of EIS development is the scoping process. The scoping process for the Tappan Zee Bridge/I-287 Corridor Project started with the 2003 Scoping Meetings and is closing with the publication of this *Scoping Summary Report*. This *Scoping Summary Report* provides an overview of the findings of the scoping process, as well as how public and agency comments have affected the development of the NEPA process.

The scoping process has been used to identify the range of alternatives, impacts, and significant issues to be addressed in the DEIS. During the scoping phase:

- Agency roles and responsibilities were established (Chapter 1).
- Purpose and Need was clarified (Chapter 2).

- The method for addressing issues raised by the public and agencies in the EIS was established. (Chapter 3).
- Future public involvement opportunities were identified (Chapter 3 and Appendix B).
- The range of alternatives to be considered was established, including the recommendations that a combination of bus rapid transit (BRT) and commuter rail transit (CRT) and only bridge replacement alternatives be evaluated alongside the no-build alternative in the EIS (Chapter 4).
- Areas of environmental concern were identified and how the impact assessment will proceed was established (Chapter 5).
- Opportunities for environmental data coordination between regulatory agencies and the Project Sponsors were identified (Chapter 5).
- Next steps and the schedule for EIS development were established (Chapter 6).

A series of studies has been completed that support the conclusions reached in this *Scoping Summary Report*. These documents are incorporated by reference into this report, and include:

- *Scoping Comments Report* (May 2009) (summarized in Chapter 3). The *Scoping Comments Report* provides a detailed response to all comments received during the 2003 Scoping Meetings, and during the 2008 Scoping Update and Public Information Meetings.
- *Transit Mode Selection Report* (May 2009) (summarized in Chapter 4). This report was provided for agency and public comments in draft form (September 2008) and has been finalized based on comments received (May 2009).
- *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009) (summarized in Chapter 4). This report was provided for agency and public comments in draft form as the *Alternatives Analysis for Rehabilitation or Replacement of the Tappan Zee Bridge* (September 2008) and has been finalized based on comments received (March 2009).

These reports can be found on the project Web site (www.tzbsite.com) and at document repositories in the corridor (locations also listed on the Web site).

1.1 Environmental Review Process

1.1.1 The NEPA Process

The NEPA process for this project, from outset through to the Final EIS (FEIS), is as follows (Figure 1-1):

- Commencement of the EIS process began with the publication of the Notice of Intent (NOI) to prepare an EIS in the *Federal Register*. The Project Sponsors also published notices in local papers.
- Scoping was conducted to receive public and agency input and further define what will be included in the Draft EIS (DEIS).

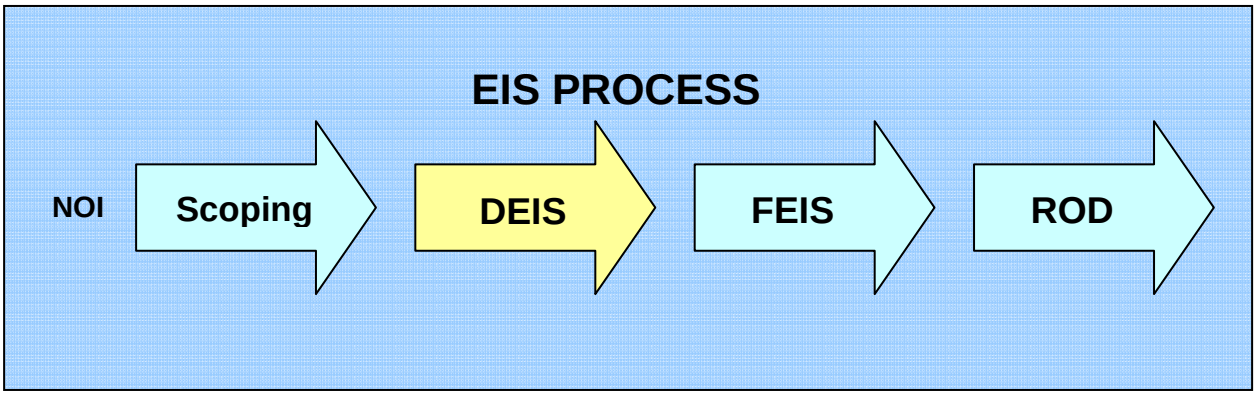

Figure 1-1 The EIS Process

- The DEIS will include the following analysis: definition of Project Purpose and Need, description of alternatives, evaluation of existing conditions, and analysis of impacts and mitigation. A notice of availability (NOA) for the DEIS will be published in the *Federal Register*. The Project Sponsors will also publish notices in the local papers. The DEIS will then be made available for public and agency review.

- The DEIS, including the details of the preferred alternative, will be circulated to all parties interested in or having jurisdiction by law over the proposed action. It will be made available to the public at least 30 days prior to the public hearing. As per NEPA and SAFETEA-LU Section 6002 guidelines, a public hearing will be held. SAFETEA-LU Section 6002 stipulates that the public comment period not exceed 60 days unless a different period is agreed to by the Federal Partners, Project Sponsors, and Participating Agencies.

- At the conclusion of the DEIS circulation and comment period, the Project Sponsors will review the comments and refine the document to produce an FEIS. The FEIS will respond to all substantive comments on the DEIS. In response to comments received during public and agency review, the FEIS will provide additional detail on design, impacts and mitigation commitments where significant adverse impacts are identified. The FEIS will serve as the basis for environmental findings and determinations needed to conclude the environmental review process through the issuance of a Record of Decision (ROD) by the federal agencies and the issuance of Findings by state agencies pursuant to SEQRA.

1.1.2 Notice of Intent and SAFETEA-LU

On December 23, 2002, the original NOI to prepare an Alternatives Analysis (AA) and an EIS for the 30-mile corridor between Suffern and Port Chester, NY was published in the *Federal Register* (Volume 67, No. 246). Since that time, extensive scoping, publication of the *Alternatives Analysis Report* (January 2006), and public involvement activity have occurred.

While the project activities advanced, SAFETEA-LU was signed into law on August 10, 2005, refining the environmental review process under NEPA and increasing the opportunities for public involvement. Further, due to the regional importance of the project, NYSDOT increased its involvement in the project

over time. With the formal adoption of a Memorandum of Agreement (MOA) in May 2007 by the Project Sponsors, NYSDOT became the Project Director.

As a result of these changes, FHWA and FTA requested that the Project Sponsors reissue the NOI, formally recognizing the role of NYSDOT and officially complying with the SAFETEA-LU Section 6002 guidance for current activities and future work. The purpose of the revised NOI, published in the *Federal Register* on February 14, 2008 and found in Appendix A, was to define the realignment of project management, including the addition of NYSDOT as a Project Sponsor, acknowledge adherence to the provisions of SAFETEA-LU Section 6002, and update interested parties regarding the proposed project and the plan to prepare a tiered EIS (including explanation of the tiered approach).

1.2 The Tiered Analysis Approach

The Tappan Zee Bridge/I-287 Corridor Project is multimodal, with proposed bridge, highway, and transit improvements. The Project Sponsors, in an effort to expedite the delivery of integrated, multimodal transportation improvements in a way that allows each modal element to advance at its own pace, have decided to prepare the NEPA documentation for this project using a tiered analysis approach. Tiering was authorized as part of FHWA/FTA regulations (23 CFR 771.111(g)) and CEQ regulations (40 CFR 1502.20). Tiering is intended to focus on general matters in a broad statement or analysis with a subsequent focus on a narrower statement or analysis. Tiering has been successfully applied to other projects.

According to the FHWA (http://environment.fhwa.dot.gov/integ/case_missouri.asp), tiering is described as follows:

> *Tiering allows project sponsors to conduct the planning and NEPA activities for large transportation projects in two phases: a Tier 1 Analysis addresses broad, overall corridor issues, such as general location, mode choice and land use impacts and a Tier 2 Analysis focuses on site-specific impacts, costs and mitigation measures. The first tier usually results in a NEPA document with the appropriate level of detail for corridor-level decisions. Second tier studies result in traditional project-level environmental documents.*

The current EIS will include a Tier 1 transit analysis and a Tier 2 bridge and highway analysis as described below and illustrated in Figure 1-2. The scope of analysis in each tier will be appropriate to the level of detail necessary to make informed decisions, and will incorporate input received from the public and reviewing agencies. The intent of the Project Sponsors and Federal Partners is for the Tier 1 transit and Tier 2 bridge and highway analyses to be developed concurrently in order to maximize the efficiencies and the potential for multimodal solutions. The two tiers of analysis are:

- **Tier 1 Transit Analysis**: Tier 1 transit analysis is the first step of a two-step process to comply with environmental review under NEPA. The Tier 1 transit analysis will provide a broad evaluation of planning level alternatives to determine the general effects on the human and natural environment resulting from the mode choices, alignments, locations and termini of facilities and services under consideration in the EIS. In addition, the general locations of suggested station areas will be identified and evaluated. These conceptual, planning level alternatives will be further evaluated in more detail in a future Tier 2 transit environmental process based on more refined engineering design.

- **Tier 2 Bridge and Highway Analysis**: The Tier 2 bridge and highway analysis will evaluate the potential effects of alternative engineering designs for proposed facilities on the human and natural environment. The analysis of alternatives will focus on the potential site specific impacts of the bridge and highway alternatives along the corridor and identify potential mitigation measures. This analysis will incorporate and be consistent with decisions made as part of the Tier 1 transit analysis.

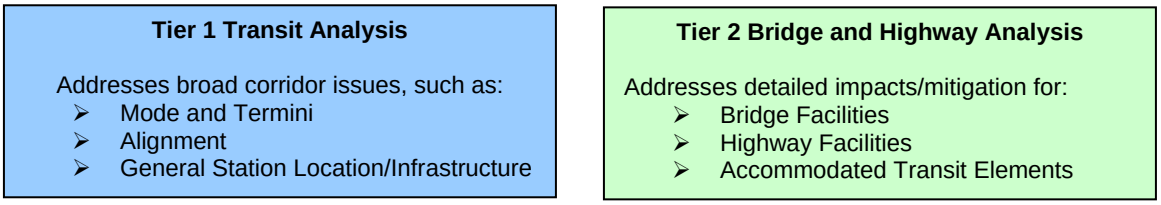

Figure 1-2 The Tiered Analysis Approach

The future Tier 2 transit environmental process will build upon the Tier 1 transit analysis and the Tier 2 bridge and highway analysis. During the future Tier 2 transit environmental analysis, the work completed during the Tier 1 transit analysis will be further refined and decisions advanced based upon more detailed engineering design. The Tier 2 transit analysis will focus in greater detail on specific elements of the transit system such as station locations and site plans, vehicle types, and storage facilities with respect to site specific impacts and mitigation measures.

Figure 1-3 depicts the scoping update and process results for the project.

1.3 Scoping Process

The CEQ has provided regulations and guidance for implementing NEPA. These regulations identify the scoping process as an early and open process for determining the range of issues to be addressed, and for identifying significant issues. One of the functions of scoping is to specify the public involvement/public hearing process for the federal and state agencies that will ultimately act upon the proposed action. Chapter 3 presents a summary of the comments received at three sets of meetings conducted by the Project Sponsors:

- The January 2003 Scoping Meetings.
- The February 2008 Scoping Update Meetings.
- The October 2008 Public Information Meetings.

At these meetings, the public was invited to comment on the project and process, and, in particular, on the following items:

- **Purpose and Need** – The Purpose and Need of a project tells the story of the transportation problem so that appropriate actions can be proposed and evaluated to address that problem. The Purpose and Need statement becomes a chapter in the EIS. The Purpose and Need for the project is presented in Chapter 2.

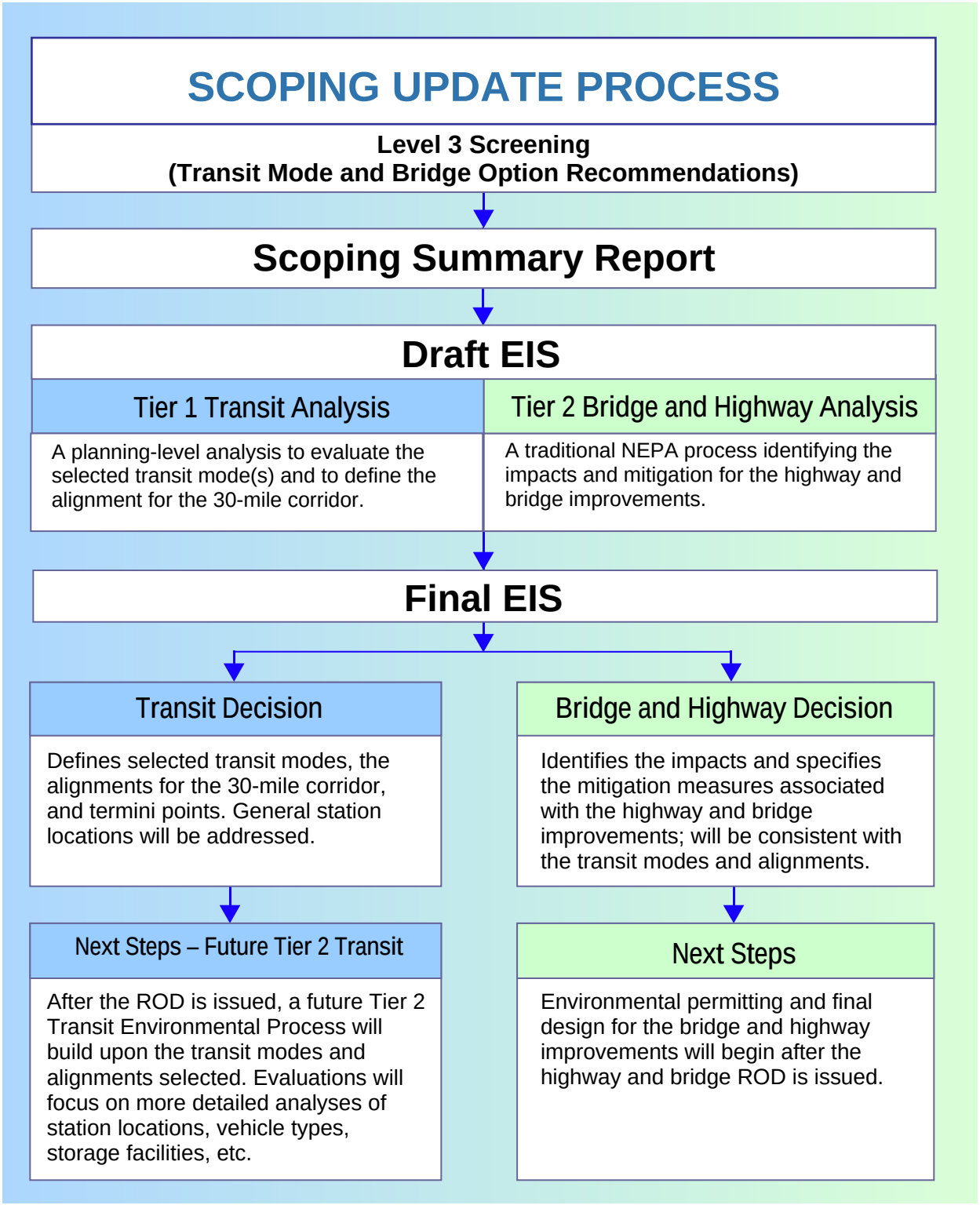

Figure 1-3 Tappan Zee Bridge/I-287 Corridor
Scoping Update Process Results and DEIS/FEIS Process

- **SAFETEA-LU Section 6002 Coordination Plan** – The plan prepared for this project identifies opportunities for public and agency interaction with federal, state and local agencies, focusing on opportunities for public and agency review and comment. This plan is discussed in Chapter 3 and appears in its entirety in Appendix B.

- **Range of Alternatives/Options** – The range of alternatives of a project identifies the reasonable alternatives that will be evaluated in the EIS. These alternatives include a variety of options for meeting the goals and objectives of the project as stated in the discussion of Purpose and Need. Chapter 4 contains a complete discussion of the range of alternatives/options and the analytic processes used to define and evaluate them.

- **DEIS Analysis Methodologies** – Chapter 5 contains a discussion of DEIS analysis methodologies. The DEIS is being prepared pursuant to NEPA and CEQ implementing regulations, and will also satisfy SEQRA requirements. Analysis will include documentation of existing conditions of the affected environment, assessment of potential short-term and long-term impacts of the range of alternatives/options on the affected environment, discussion of opportunities to mitigate impacts, and an assessment of secondary and cumulative impacts.

1.4 Agency Involvement

One of the major components of SAFETEA-LU Section 6002 is the increased opportunity for both the public and federal, state, and local agencies to have active and early involvement in the NEPA process and to get agency input on the purpose and need, environmental study methodology, and preliminary alternatives. This is intended to streamline the NEPA process and minimize costly delays at the end of the project. SAFETEA-LU Section 6002 requires Project Sponsors to identify Cooperating and Participating Agencies that will be involved in the development of the project. The public-outreach activities for this project are described in Chapter 3, and have been conducted in accordance with SAFETEA-LU Section 6002 and documented in the *SAFETEA-LU Section 6002 Coordination Plan* (May 2009) (Appendix B). In addition, there are special roles for agencies and the public in terms of Cooperating and Participating Agencies and Consulting Parties, as described below.

1.4.1 Cooperating and Participating Agencies

According to CEQ regulations (40 CFR 1508.5), "cooperating agency" means any federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative. A state or local agency of similar qualifications, or, when the effects are on lands of tribal interest, a Native American tribe, may, by agreement with the lead agencies, also become a cooperating agency. There are approximately a dozen Cooperating Agencies for this project (as listed in Appendix B), including the US Army Corps of Engineers, US Coast Guard, US Environmental Protection Agency, and the NYS Department of Environmental Conservation.

“Participating Agencies” are those federal, state, or local agencies or Native American tribes with an interest in the project. The participating agencies requirement is part of SAFETEA-LU Section 6002. The standard for participating agency status is more encompassing than the standard for cooperating-agency status. Therefore, cooperating agencies are, by definition, participating agencies, but not all participating agencies are cooperating agencies. Participating and cooperating agencies are responsible for identifying,

as early as practicable, any issues of concern regarding the project's potential environmental or socioeconomic impact that could substantially delay or prevent an agency from granting a permit or other approval. There are approximately 50 Participating Agencies for this project (as listed in Appendix B), including the National Park Service, the Port Authority of New York and New Jersey, and many of the cities, towns, and villages in the corridor.

The Project Sponsors are working with the Cooperating and Participating Agencies to develop a strategy to address the following:

- Identify all permits required for construction of the Tappan Zee Bridge/I-287 Corridor Project.
- Identify the key jurisdictions.
- Identify when the regulatory agencies will be engaged during the EIS process.
- Identify the key issues and requirements for a complete permit application.
- Identify documentation requirements relevant to permit application submission.
- Set forth a schedule for permit application preparation, agency review and permit issuance.

1.4.2 Consulting Parties

Section 106 of the National Historic Preservation Act (36 CFR Part 800) requires federal agencies to take into account the effects of their undertakings on historic properties that are listed in or meet the eligibility criteria for listing in the National Register of Historic Places. The parties involved in this process include:

- Federal agencies sponsoring the undertaking.
- Advisory Council on Historic Preservation.
- Consulting parties, including:
  - State Historic Preservation Offices (SHPOs).
  - Indian tribes.
  - Tribal Historic Preservation Offices (THPOs).
  - Representatives of local governments.
  - Applicants for federal assistance, permits, licenses, or other approvals.

A meeting of Consulting Parties was held in Fall 2008 prior to the close of the comment period on the transit mode and bridge recommendations and additional meetings will be conducted.

2 Project Context

This chapter presents the project context through description of project location and background, regional growth trends, and transportation conditions and deficiencies that led to formulation of the Project Purpose and Need. In order to allow informed decision making, it is NYSDOT policy that scoping documentation provide sufficient information to provide clear understanding of the problems and conditions within the project area and the context in which the project will be developed. This information has been summarized and can be found in Appendix D.

2.1 Project Location

The corridor extends approximately 30 miles through Rockland and Westchester Counties, from Suffern to Port Chester, and includes the 3.1-mile-long Tappan Zee Bridge crossing of the Hudson River (Figure 2-1). The corridor encompasses an 18.4-mile section of the New York State Thruway and the entire 10.9-mile Cross Westchester Expressway (CWE).

This section of the Thruway carries a joint I-87/I-287 designation, and the CWE carries the I-287 designation. The CWE is owned by NYSDOT and NYSDOT is responsible for capital improvements. It is maintained and patrolled by NYSTA from Exit 1 to Exit 12, at the east end of the study area. Both the Thruway and the CWE are critical links in the Federal Interstate Highway System.

The two interstate highways, I-87 and I-287, serve distinct functions. I-87, the main route through the Hudson Valley, connects New York City and Canada, extending from I-278/Triboro Bridge to the Canadian border at Champlain, New York. I-287 is a circumferential route serving the New York and New Jersey metropolitan area. It serves suburb-to-suburb trips in addition to long-distance trips (i.e., from New Jersey and to New England), enabling vehicles to bypass New York City and its congestion.

The Tappan Zee Bridge provides the principal Hudson River crossing between the George Washington Bridge (I-95) 15 miles to the south, and the Newburgh-Beacon Bridge (I-84) 31 miles to the north. (The Bear Mountain Bridge, approximately 18 miles to the north, with one lane each way, carries significantly less traffic because of its less urbanized setting, as well as its indirect east-west connections.)

Whereas the major north-south freeway routes along the west side of the Hudson River are parkways (Palisades Interstate Parkway, Garden State Parkway) that exclude trucks, the Tappan Zee Bridge handles a substantial amount of roadway-freight goods movement. Trucking uses the Tappan Zee Bridge rather than the more congested George Washington Bridge.

The number of heavily used connecting highways and arterials traversing and linking with the corridor underscores its status as an essential and integral part of the local, regional, and national transportation network. Furthermore, its direct links to interstate highways at both ends – I-287 from the south and I-87 from the north at the west end in Suffern, and I-95 at the east end in Port Chester – confirm the corridor's standing as a vital and essential link in the regional and national transportation network.

Figure 2-1 Tappan Zee Bridge / I-287 Corridor

2.2 Project Background

Transportation, engineering, and environmental studies have been undertaken over the last several years for the Tappan Zee Bridge/I-287 Corridor Project to document transportation conditions, deficiencies, engineering considerations, and environmental issues in the corridor. The major documents released to date for this project are the *Alternatives Analysis Report* (January 2006), the *Transit Mode Selection Report* (May 2009), and the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009) (see Chapter 4).

Background studies have also been conducted to document existing conditions and the affected environment. Technical studies included traffic counts, origin/destination studies, ecological conditions in the Hudson River, noise levels, bridge condition inventory, and facility location studies. The background studies will be documented in the DEIS and related technical reports for the project.

All the studies conducted to date have helped establish the Purpose and Need for the project by identifying corridor conditions and identifying potential solutions. The studies also supported the analysis of potential transit, highway, and bridge alternatives and options to understand the consequences of different investment choices. The environmental and transportation studies conducted to date are summarized in Chapters 4 and 5, while engineering studies are summarized below.

Over the past several years, in addition to the significant expenditures made on bridge maintenance, many transportation improvements have been made in the corridor by the Project Sponsors and others, including:

- Tappan Zee Bridge:
  - Installation of a movable barrier that allows operation of a seven-lane cross section with four lanes in the peak direction.
  - Electronic toll collection.
  - Variable pricing for commercial vehicles.
- Transit improvements:
  - Adding express bus services on I-87/I-287.
  - Feeder bus service across the river to the Tarrytown train station (where passengers bound for Manhattan can transfer to Metro-North's Hudson Line).
  - Ferry service between the Ossining train station and Haverstraw.
  - Opening of park-and-ride lots in Rockland County.
- Highway improvements:
  - A number of lane additions and other roadway improvements in Rockland County east of Interchange 11.
  - Modifications to the Spring Valley toll barrier.
  - Reconstruction/reconfiguration of I-87/I-287 Interchange 8 in Westchester County.
  - Other safety and operational roadway improvements on I-287 in Westchester County.

Even with these improvements, congestion in the corridor has grown steadily and continues to have a negative impact on mobility in the corridor. In addition, the aging Tappan Zee Bridge structure has reached the point where major reconstruction is needed just to sustain this vital link in the transportation system. Further discussion of transportation conditions and needs in the corridor can be found in the Project Purpose and Need (Subchapter 2.4) for the transit, highway, and bridge components of the project.

2.3 Growth Trends in the Corridor

The corridor continues to grow both in population and employment. Traffic crossing the bridge has grown from 100,000 daily trips to nearly 135,000 daily trips between 1990 and 2000 (a growth rate of 35 percent over 10 years), driven by the opening of I-287 in New Jersey. Rockland and Westchester Counties are a mix of urban and suburban development, with a few areas of dense commercial activity, such as the corporate parks in Harrison, commonly referred to as the Platinum Mile. According to projections from the New York Metropolitan Transportation Council (NYMTC), which is the Metropolitan Planning Organization (MPO) for New York City, Long Island, and the Lower Hudson Valley, continued future economic growth is expected for Rockland and Orange Counties. As the MPO, NYMTC provides the official population and demographic forecasts that are utilized in the development of transportation projects in the region.

NYMTC also projects that outlying counties of the region are expected to experience significant increases in both population and employment over the next 20 years. Between 2000 and 2025, New York City metropolitan area regional household population, as defined by the US 2000 Census, is expected to grow by 12 percent, while Rockland County is expected to grow by 18 percent and Orange County by 27 percent. Westchester County, the most developed county in the study area, is projected to have a more stable population growth, at four percent. In developing the growth projections for the DEIS, the Project Sponsors will utilize the latest NYMTC forecast.

In addition to population growth, employment is also projected to increase within the corridor. All three counties are expected to exceed the forecasted New York City Metropolitan area regional employment growth of 17 percent: Westchester County will grow by 19 percent, Rockland County by 29 percent and Orange County by 35 percent. This increase in population and employment will continue to place demands on the corridor, including the bridge.

Peak-period traffic has grown over 50 percent in the corridor since the mid-1980s. As the population and commercial activity in the region continues to grow, the travel demands in the corridor will increase. Without implementation of additional travel choices and improved capacity throughout the corridor, the projected growth in traffic will create additional congestion and associated delays for the commuters who rely on the corridor's transportation system. This increased congestion will have the potential to restrict economic growth and development in the counties, in addition to diminishing overall quality of daily life.

Traffic volume is also growing at other points in the corridor as development occurs throughout this region. Congestion on I-287 is spilling over onto parallel arterials, in particular, NY Route 59 in Rockland County and NY Route 119 in Westchester County, especially during peak periods. These conditions further exacerbate existing capacity constraints.

Many of the counties in the region have seen increasing growth and development over the past several decades. For example, in Rockland County, which lies just west of the Hudson River, the population has more than tripled, from 89,276 in 1950 to 286,753 in 2000, a growth of over 200 percent over 50 years. Orange County, to the north of Rockland, increased its population from 152,255 to 341,367, an increase

of 124 percent over the same period. In Westchester County, which is just east of the Hudson River, the population has had a more modest increase, from 625,816 in 1950 to 923,459 in 2000, a growth of 48 percent over 50 years. However, Westchester County saw a major increase in commercial development in the 1950s and 1960s with the completion of the interstate highways I-95, I-87, I-287, and I-684. This led to a surge in corporate headquarter relocations to the area, including in the Platinum Mile section of I-287 in the Town of Harrison.

Most of this recent development in the region has followed the dominant national pattern of low-density, automobile-dependent suburbanization. A pattern of land use development that has contributed to a degradation of the natural environment through massive loss of farmland and open space. Low-density sprawl development also increases highway congestion with an over-dependence on single-occupant vehicle travel.

The Project Sponsors recognize the intimate relationship between transportation improvements and land use consequences and seek to address future land use development by encouraging "smart growth", specifically by providing new and enhanced transit service in this key corridor. With the cooperation of local governments, the proposed transit services and new stations will provide opportunities for more compact mixed-use future development, thereby encouraging the use of alternatives to the automobile, including, walking, biking, and the use of transit to make the essential trips to work, shopping, schools and recreation. To further these goals, NYSDOT is implementing (on a parallel track to this environmental analysis) a new Transit-Oriented Development (TOD) Training Program. The program will involve nationally-renowned firms to engage local officials and communities in the corridor and explore specific opportunities for TOD in their communities, as presented by the project alternatives.

2.4 Purpose and Need

Following the Scoping and Public Information Meetings in 2003 and 2008, further analysis was conducted based upon input from stakeholders and the public. As a result, the Project Purpose and Need has been clarified to better articulate the transportation needs of the corridor and to clarify the goals and objectives of the project. The current Project Purpose and Need builds on the problems and deficiencies in the corridor, and clarifies the basis for the consideration and selection of solutions to effectively and efficiently deliver the project while respecting the natural and human environment.

Studies conducted for this project have shown that several transportation improvements, including improved mobility, transit options, and safety, are needed in order to meet the growing travel demands of the corridor. Travelers in the corridor experience significant delays due to congestion, as corridor facilities often operate near capacity, particularly in the vicinity of the Tappan Zee Bridge. Rockland County is one of the fastest-growing communities in the Metropolitan Region, and Westchester is experiencing employment growth in areas around White Plains and the Platinum Mile. The Tappan Zee Bridge and the corridor provide an important link between these communities and to the overall regional transportation network. In addition to the capacity constraints of the corridor, the Tappan Zee Bridge is aging and in need of a regular and extensive maintenance program. As the region grows, travel demand will increase on an already-strained roadway network.

Based on these considerations, the Project Purpose and Need is to:

- Preserve the river crossing as a vital link in the regional and national transportation network.

- Provide a river crossing that has structural integrity, meets current design criteria and standards, and accommodates transit.
- Improve highway safety, mobility, and capacity throughout the corridor.
- Improve transit mobility and capacity throughout the corridor and travel connections to the existing north-south and east-west transit network.

In the following subchapters, each of these needs is discussed in more detail; additional information on conditions within the corridor can be found in Appendix D (Project Context).

2.4.1 Preserve the River Crossing as a Vital Link in the Regional and National Transportation Network

The Tappan Zee Bridge is a critical infrastructure element within the corridor spanning the Hudson River between Rockland and Westchester Counties. Located between the Newburgh-Beacon Bridge to the north and the George Washington Bridge to the south, it is the only Hudson River crossing for approximately 46 miles (outside of the two-lane Bear Mountain Bridge). As a result of the region's limited river crossings, the Tappan Zee Bridge provides a vital link to communities east and west of the bridge as well as north and south. If the bridge were to become unserviceable, the consequences would be devastating to both the regional and local transportation networks and to their economies.

2.4.2 Provide a River Crossing that has Structural Integrity, Meets Current Design Criteria and Standards, and Accommodates Transit

Constructed in 1955, the 3.1-mile-long Tappan Zee Bridge does not meet current NYSDOT bridge and highway standards with respect to such characteristics as lane width, shoulders, and emergency lanes, and falls short of its engineering standards with respect to seismic and security ratings. It should also be noted that the existing traffic volumes on the bridge far exceed the design traffic capacity. In addition, as the bridge has aged, an extensive and costly maintenance program has been required to keep it in a state of good repair. The expenditure for the maintenance program has increased over the years, and is expected to total one billion dollars, (in 2012 dollars), by the year 2010. In September 2007, major rehabilitation of the deck bearings, barriers, steelwork, and concrete commenced. However, rehabilitation will not resolve all deficiencies, and additional improvements will be required.

In addition, due to the extensive maintenance and improvement programs required, elements of the bridge do not meet current NYSDOT standards. Without shoulders, isolated events such as vehicle breakdowns and minor traffic accidents can cause severe congestion in both directions. In turn, these can become major problems in terms of safety and traffic flow.

In a 3-year period from July 2004 to June 2007 there were 1,645 accidents that occurred between Interchange 9 in Tarrytown and Interchange 10 in Nyack, which includes the Tappan Zee Bridge, the approaches to the bridge, and the toll plaza. The calculated accident rate on this 3.89-mile roadway segment for this period is 2.77 accidents per million vehicle miles (acc/MVM). The statewide average accident rate for a similar facility (an urban, controlled access, divided, seven-lane roadway) is 1.37

acc/MVM. Therefore, the accident rate on the Tappan Zee Bridge and its approaches is two times the statewide average. Since this rate is greater than two times the statewide average, the roadway segment of the bridge will be evaluated in the DEIS to determine the contributing factors to the higher than average rate. The geometric features that likely contribute to the high accident rates include the 3 percent grades, non-standard lane widths, lack of shoulders and sun glare.

The bridge is classified by NYSDOT and NYSTA as a "critical bridge" based on its status as a lifeline structure and important link in the roadway network. While the existing conditions are safe, several structural issues need to be addressed. The bridge does not meet the current seismic performance standards for safety and functionality for a critical bridge as defined by AASHTO *Standard Specifications for Highway Bridges* and modified by NYSDOT *Blue Pages* (Division 1A, Sections 6A and 6B).

The Tappan Zee Bridge also has major vulnerabilities, which include those related to overload, steel details, and vessel collision. The most recent study of the corridor – the *Long Term Needs Assessment and Alternatives Analysis* (April 2000), which was initiated by the Governor's I-287 Task Force – concluded that all of the long-term alternatives evaluated by the Task Force called for replacement of the Tappan Zee Bridge. Rehabilitation of the existing structure, it was concluded, would be highly disruptive, cost an estimated $1.1 billion (2012 dollars), and would not result in the necessary safety improvements, mobility enhancements, or capacity improvements.

In assessing reasonable options for replacement or rehabilitation of the bridge, the earlier evidence and the evaluation of current conditions, as documented in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009), reinforce the conclusion of the Governor's I-287 Task Force in 2000 that replacement should be the preferred river-crossing option. Moreover, as mass transit offers the only realistic means of addressing the requirements of improving mobility in the corridor, replacement options incorporate provision for the various transit modes, thus ensuring a structure designed from the outset to accommodate transit.

2.4.3 Improve Highway Safety, Mobility, and Capacity Throughout the Corridor

During the past 20 years (beginning in the mid-1980's), due to growth in population and jobs as well as changing inter-corridor commute patterns, traffic volumes have grown significantly in the corridor – more than 50 percent in the I-287 corridor and more than 70 percent on the bridge. When the bridge opened to traffic in 1955, it carried an average of 18,000 vehicles daily during its first year of operation. Since 1990, traffic crossing the Tappan Zee Bridge has grown from 100,000 daily trips to nearly 140,000 daily trips. This is a 40 percent increase over 15 years and a nearly eight-fold increase from the time of opening. Additionally, on some peak days, volumes are as high as 170,000 vehicles. These existing traffic volumes on the bridge far exceed the design traffic capacity.

Rockland and Westchester Counties are primarily made up of urban and suburban communities, with a few areas of dense commercial activity, such as the Platinum Mile. According to projections from NYMTC, robust future economic growth is expected for Rockland and Orange Counties. As the population and commercial activity in the region increase, so too will the demands placed upon the transportation network in the corridor.

Traffic is also growing at other points in the corridor as urban activity develops throughout this region. Especially during peak periods, congestion on I-287 is spilling over onto parallel arterials – in particular, NY Route 59 in Rockland County and NY Route 119 in Westchester County – contributing to the

existing capacity constraints. Therefore, it is imperative that viable transit systems be established to provide capacity across the corridor. These transit systems on dedicated ROW are less susceptible to congestion problems caused by growth than highway facilities.

In addition to commuter traffic, weekend traffic is also expected to increase. Traffic volumes are projected to grow by 30 percent by 2025 for holidays and summer weekends in Rockland County. The currently large number of non-work, recreational travelers during the Friday PM peak period would continue to grow and thereby create more westbound congestion than on the typical weekday. Similarly, Sunday afternoon and evening eastbound congestion, which is worse than the weekday AM peak period, would likewise increase.

According to an origin and destination survey conducted for the project in 2003, the trips crossing the bridge split with 29 percent headed for New York City and 68 percent crossing the corridor. The majority of daily eastbound commuters crossing the Tappan Zee Bridge are bound for locations in central and southern Westchester County. Of trips with destinations outside the corridor, the most numerous are to Connecticut and the Bronx, representing 10 and 16 percent of total trips, respectively. Figure 2-2 depicts the commuting patterns of vehicles traveling eastbound across the Tappan Zee Bridge.

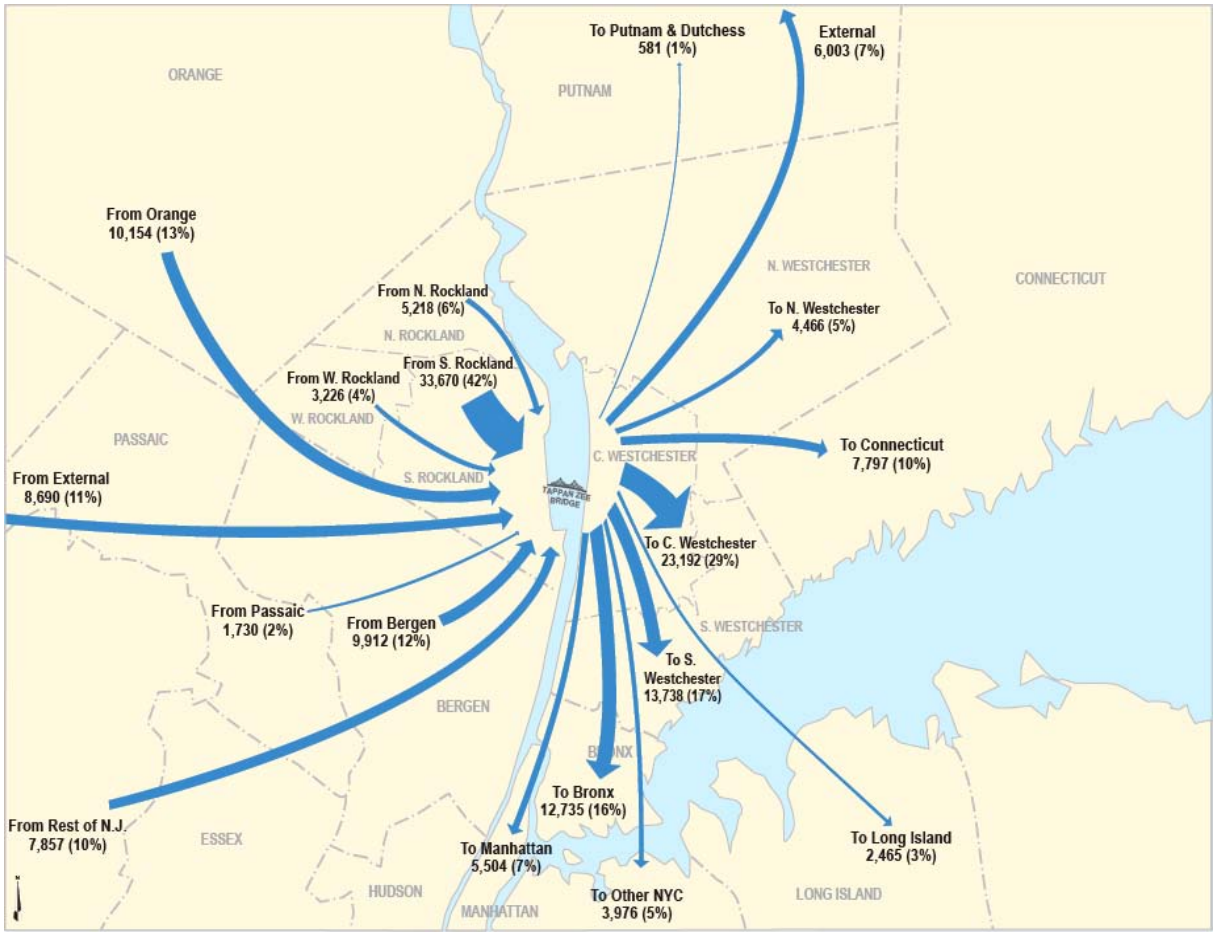

Figure 2-2 Tappan Zee Bridge Eastbound Average Weekday Person Trips

According to the survey, the majority of eastbound trips across the Tappan Zee Bridge are in single-occupancy vehicles (SOVs). On an average weekday AM peak period, 27,813 vehicles cross the Tappan Zee Bridge, and 24,031 are SOVs. Currently, only two percent of the commuters that cross the Tappan Zee Bridge do so via public transit. Of vehicles crossing the bridge in the peak period, 86 percent are SOVs, approximately 7 percent are trucks, 7 percent are high-occupancy vehicles (HOVs) and other vehicles, and less than 1 percent are buses.

Several measures have been implemented to improve both mobility and the capacity of the bridge, including TDM/TSM improvements. Most notably, a movable barrier that allows operation of a seven-lane cross section with four lanes in the peak direction was installed to increase the capacity of the bridge during the peak period; *E-ZPass* tolling was installed at the toll plaza to improve mobility; and variable pricing for commercial vehicles was implemented to reduce truck traffic at peak periods. Through these proactive measures, the bridge now handles 120 percent of its intended 1955 design capacity.

2.4.4 Improve Transit Mobility and Capacity Throughout the Corridor and Travel Connections to the Existing North-South and East-West Transit Network

In addition to traffic congestion – and a contributing cause to that congestion – there is a lack of travel choices for commuters, which constitutes another major transportation deficiency in the corridor. Other than bus services operated in mixed traffic, which suffer the same congestion as all other traffic, no other east-west modal alternatives exist in the corridor.

There are several existing bus networks throughout the corridor, including both the *Bee-Line* (Westchester County) and Transit of Rockland (TOR) local buses and express buses to Manhattan. These buses are operated either by the county or by private bus companies under contract to the county. The TOR operates the Tappan Zee Express (TZX) buses from Rockland County across the Tappan Zee Bridge to the Metro-North Tarrytown Station and to the White Plains Transportation Center. Additional bus service is operated by the Orange Westchester Link (OWL).

The corridor is also served by commuter rail. Metro-North Railroad operates commuter rail service on both sides of the Hudson River corridor. Five lines radiating from New York City cross the corridor. The Port Jervis Line and Pascack Valley Line in Rockland County are operated by agreement with New Jersey Transit (NJTransit) and serve Secaucus and Hoboken. The Hudson, Harlem, and New Haven Lines are oriented to the Manhattan commuter travel market and operate through Westchester County and serve Grand Central Terminal (GCT). The existing commuter rail lines provide only north and south service from Orange and Rockland Counties through New Jersey into Hoboken or Penn Station, and rail lines from Westchester, Putnam, and Dutchess Counties and from Connecticut provide service to GCT.

The West-of-Hudson rail lines are “underutilized” when compared to Metro-North’s lines east of the Hudson River. This is due to the Port Jervis and Pascack Valley lines having lower frequency of service, the need to transfer at Secaucus or Hoboken, and the added travel time for many riders to get to their jobs in east-midtown (via walking or subway). The West-of-Hudson rail market share is 15 to 20 percent, compared to 80 percent for Metro-North’s East-of-Hudson service. Furthermore, only half of the share of the West-of-Hudson total is on the Port Jervis and Pascack Valley Lines – half of the riders from Orange and Rockland go to the Hudson Line because of better service to New York.

One of the goals of the Tappan Zee Bridge/I-287 Corridor Project is to improve mobility in the corridor by increasing usage and market share for the West-of-Hudson lines by providing more frequent, faster service directly to Manhattan's east side and by-passing the capacity constraints in New Jersey. Currently there are other transit projects being implemented by NJTransit – such as Access to the Region's Core (ARC) – that are expected to improve service to Manhattan for West-of-Hudson commuters. ARC will provide a one-seat service to the west side of Manhattan for west-of-Hudson commuters.

The Tappan Zee Bridge/I-287 Corridor and ARC Projects have a large overlapping market, predominantly Orange and Western Rockland County riders bound for Manhattan. However, transit users originating in these markets would prefer to ride a transit service that terminates either on the east side or the west side of Manhattan, depending on their work location. Employment projections indicate that the employment split between the east side and the west side will be approximately 45 percent to 55 percent, respectively, in 2035. Thus, the project complements ARC by offering more transit choices for Orange and Rockland County residents, resulting in increased ridership.

The nearest exclusive transit crossings of the Hudson River are located to the south, in New York City: the Lincoln Tunnel bus lane that serves the Port Authority Bus Terminal, and the Northeast Corridor rail tunnel that connects to New York's Penn Station. As a result, a number of potential transit markets are not served by a dedicated transit system. These transit markets include trips from origins west of the Hudson River to Midtown Manhattan; travel wholly within the corridor among Rockland and Westchester County origins and destinations; and travel through the corridor with either an origin or destination in Orange, Bergen, Putnam, Dutchess, or Fairfield Counties.

2.5 Goals and Objectives

The project goals and objectives are developed to respond to the Purpose and Need. Objectives are used to measure progress in the attainment of goals. Project alternatives are developed to respond to the Purpose and Need and are evaluated by how well they meet the goals, as measured by their performance against the objectives. In addition, the Project Sponsors will work with various local officials and groups to ensure that the project goals support smart-growth and sustainable-planning practices by communities affected by the project. All levels of evaluation conducted throughout the project will be consistent with the Purpose and Need and the project's goals and objectives. Table 2-1 depicts how the goals and objectives map to elements of the Purpose and Need statement.

2.6 Transportation Plans, Existing Conditions, and Deficiencies

Transportation plans, existing conditions, and deficiencies are presented in detail in Appendix D for the highway, bridge, and transit components of the project. Each of the three discussions addresses the following topics (where appropriate):

- Corridor Description.
- Existing Highway Operations.
- Safety Considerations.
- Shared Use Facilities.
- Highway and Transit Infrastructure.
- Existing Conditions of the Tappan Zee Bridge.
- Landscape and environmental enhancement opportunities.

Table 2-1

Mapping of Goals and Objectives to Elements of Purpose and Need

Goals and Objectives	Purpose and Need Elements
Improve the mobility of people, goods and services for travel markets served by the Tappan Zee Bridge. ▪ Reduce traffic congestion levels. ▪ Improve travel times for local trips. ▪ Improve travel times for regional trips. ▪ Provide modal travel alternatives not subject to roadway congestion. ▪ Increase the share of travel demand accommodated by transit and ridesharing. ▪ Provide for non-motorized means of travel, such as bicycle and pedestrian traffic.	▪ Improve highway safety, mobility, and capacity throughout the corridor ▪ Improve transit mobility and capacity throughout the corridor and travel connections to the existing north-south and east-west transit network.
Maximize the flexibility and adaptability of new transportation infrastructure to accommodate changing long-term demand. ▪ Maximize the ability to accommodate increases in travel demand. ▪ Minimize constraints to serving future travel patterns and markets. ▪ Encourage smart growth linked to transit.	▪ Improve highway safety, mobility, and capacity throughout the corridor ▪ Improve transit mobility and capacity throughout the corridor and travel connections to the existing north-south and east-west transit network.
Maintain and preserve vital elements of the transportation infrastructure. ▪ Ensure that the corridor's transportation infrastructure meets current standards for structural design and integrity.	▪ Provide a river crossing that has structural integrity, meets current design criteria and standards and accommodates transit. ▪ Preserve the river crossing as a vital link in the regional and national transportation network.
Improve the safety and security of the transportation system. ▪ Reduce motor vehicle accident severity and rates. ▪ Improve roadway geometrics to applicable standards. ▪ Improve the likelihood that the bridge would withstand a severe natural or manmade event.	▪ Improve highway safety, mobility, and capacity throughout the corridor ▪ Improve transit mobility and capacity throughout the corridor and travel connections to the existing north-south and east-west transit network. ▪ Provide a river crossing that has structural integrity, meets current design criteria and standards and accommodates transit.
Avoid, minimize and/or mitigate any significant adverse environmental impacts caused by feasible and prudent improvements. ▪ Minimize community disruption, displacement, and relocations; as well as adverse impacts to public parks, visual resources and aesthetics in the corridor. ▪ Minimize adverse impacts to the natural environment, including the Hudson River estuary. ▪ Implement mitigation measures that are feasible, constructible, innovative, sustainable cost-effective and that address regulatory requirements.	▪ Improve highway safety, mobility, and capacity throughout the corridor ▪ Improve transit mobility and capacity throughout the corridor and travel connections to the existing north-south and east-west transit network. ▪ Provide a river crossing that has structural integrity, meets current design criteria and standards and accommodates transit. ▪ Preserve the river crossing as a vital link in the regional and national transportation network.

3 Public Participation and Scoping Summary

The Federal Partners and the Project Sponsors are committed to maintaining an open and transparent public and agency coordination program that will continue throughout the environmental review process for the tri-state region including New York, northern New Jersey, and southwestern Connecticut. The program for this project was designed to achieve a comprehensive public involvement process, beginning with public input in defining the goals and objectives for the project. Public involvement activities will be conducted under the guidance of and with the participation of the FHWA and FTA.

Since the inception of the project, several goals for achieving the desired comprehensive public involvement have been identified, and they continue to serve as the basis for the public involvement effort. The goals are to:

- Establish effective communication with all stakeholders.
- Educate the public about the environmental review process and the role of government and all stakeholders, including citizens.
- Engage the public in the environmental review process.
- Ensure that the public has the opportunity for input in the development of the alternatives and in the scope of technical analyses.
- Create opportunities to communicate with local communities.
- Inform the public of the progress of the study and of additional opportunities to participate in the process.
- Incorporate the results of the public and agency coordination process into the EIS.

The *SAFETEA-LU 6002 Coordination Plan* (Appendix B) identifies opportunities for public and agency interaction with federal, state, and local agencies, focusing on opportunities for public and agency review and comment. The agencies have been invited to participate in the NEPA process, and it is anticipated that their comments on the plan, as well as comments by the public, may lead to further plan revisions. Comments have been accepted on the plan through the conclusion of the formal comment period established as part of the scoping update process.

3.1 Public Involvement Process

A comprehensive public participation process has been carried out throughout the study, and has included briefings, meetings, creation of Stakeholders' Advisory Working Groups (SAWGs), development of a project Web site, community outreach centers, and scoping meetings, as described below.

3.1.1 Briefings and Meetings

Briefings and meetings were held with public officials, agencies and interest groups throughout the corridor and region. Each presentation was tailored to the audience's interest, and was followed by a question-and-answer period. Numerous meetings were held between the completion of the *Alternatives Analysis Report* (January 2006) and the preparation of this report.

At key points in the project, the NYSDOT, NYSTA, and Metro-North will continue to sponsor public workshops to present information and obtain feedback from the community. Public workshops will continue to be used as an educational tool to provide information on the process, and as a venue for soliciting input on certain topics (such as the screening of alternatives). The meetings and workshops will be broadly promoted via such means as direct mail, the project Web site, and media outlets.

The major public meetings conducted for the project were as follows:

- Open House Pre-Scoping Meeting (October 2001).
- Original Public Scoping Meeting (January 2003).
- Public Workshop 1 – Introduction of Level 1 Elements (April 2003).
- Public Workshop 2 – Introduction of Level 2 Scenarios (July 2003).
- Public Workshop 3 – Results of the AA Process (December 2005).
- Project Update and Development of Alternatives/Options (February 2007).
- Scoping Update Meeting (February 2008).
- Public Information Meeting (October 2008).

Meetings were also held with the following entities:

- **The Inter-Metropolitan Planning Organization (IMPO).** IMPO was created to provide continuous and comprehensive input into the project. The IMPO committee is chaired by NYSDOT and includes members such as the FHWA, FTA, and county planning organizations. Meeting regularly since 2002, IMPO assists the FHWA, FTA, and the Project Sponsors to identify key regional issues and proposed solutions, and provides technical review of project materials.

- **Westchester Rockland Tappan Zee Futures Task Force.** In 2005, the county executives of Westchester and Rockland Counties established an inter-county task force to raise the awareness of the Tappan Zee Bridge/I-287 Corridor Project, engage key groups and the public in the process, and provide guidance to the Project Sponsors on presentation materials and outreach activities.

- **Environmental and Regulatory Agencies**. A central element in the outreach program has been communication with various federal, state, and local agencies that will be involved in the project's environmental review process, such as the US Coast Guard (USCG), US Army Corps of Engineers (USACE), National Oceanographic and Atmospheric Administration – Fisheries (NOAA Fisheries), US Environmental Protection Agency (USEPA), US Fish and Wildlife

Service (USFWS), NYS Department of Environmental Conservation (NYSDEC), NYS SHPO, and the NYS Department of State (DOS).

- **County and Local Agencies**. The Project Sponsors held meetings with municipal representatives throughout the corridor to gain understanding of local perspectives on project-related issues. These agencies included Rockland, Westchester and Orange County planning departments, and representatives of localities such as Clarkstown, Orangetown, Spring Valley, New Hempstead, the City of White Plains, the Town of Greenburgh, the Town of Ramapo, and the Villages of Suffern, Montebello, Sloatsburg, Tarrytown, and Nyack.

- **Stakeholder Committee**: The Stakeholder Committee provides an open forum for discussion and encourages interaction among stakeholders, who represent interest groups and organizations. Through active participation of its members, the Stakeholder Committee will continue to provide a wide range of opinions to be considered throughout the project. The Stakeholder Committee is comprised of representatives of organizations that reflect the diverse nature of the tri-state region. Stakeholder Committee members include representatives from environmental organizations; municipalities; the state and federal governments (elected officials); educational institutions; development and planning organizations; emergency-services organizations; engineering and transportation organizations; hospitals and health organizations; businesses and industries; and the recreation and tourism industries. The project's extensive mailing list of over 4,000 stakeholders includes officials, libraries, MPOs, and others from New York State, northern New Jersey and southwestern Connecticut. These stakeholders receive invitations to public meetings as well as other project information.

  Regular meetings will continue to be held throughout the project, at key milestones, and as required to update and inform the stakeholders. Stakeholder Committee members will continue to be apprised of the progress of the study via regular progress reports, newsletters, and meeting minutes distributed by the Project Sponsors.

- **SAWGs:** Starting in Spring 2007, the Project Sponsors have engaged members of the public and interested individuals to participate in one of the project's four SAWGs (traffic and transit, environment, land use, and bridge-design issues). These hands-on working groups will play an important role as the EIS process moves forward. The objective of the SAWGs is to keep interested individuals informed about the project and to solicit their input and ideas. Each SAWG is intended to be a valuable forum for the exchange of information, discussion of issues, and solicitation of feedback that the Project Sponsors will take under consideration in the design development process.

- **Elected Officials**: The Project Sponsors conducted briefings at project milestones with elected officials representing constituencies in the study area.

- **Non-Governmental Organizations.** The Project Sponsors met with individual organizational members of the Stakeholder Committee and other organizations, among them, the East-West Rail Coalition, the Palisades Mall, the Regional Plan Association, the Tri-State Transportation Campaign, and Riverkeeper, to engage in more-detailed discussions of particular areas of interest.

The public provided input on a variety of factors, including the screening criteria used to assess alternatives/options, the alternatives being studied, and the scope of environmental studies to be conducted.

3.1.2 Community Outreach Centers

Community outreach centers in Westchester and Rockland Counties were established in 2003 to serve as local meeting places and to provide opportunities for community groups and individuals to obtain study information and provide feedback. The sites are equipped with copies of handouts and materials and with high-speed Internet access to the project's Web site. Project staff is on hand to answer questions. Community outreach centers are located at the following locations:

– 660 White Plains Road, Suite 340, Tarrytown, New York 10591
Telephone: (914) 358-0612; Fax: (914) 524-0288
Hours: Monday through Friday 9:00 a.m. – 5:00 p.m.

– 203 Main Street, Nyack, New York 10960
Telephone: (845) 348-7714; Fax: (845) 348-7768
Hours: Wednesday and Thursday 4:00 p.m. – 8:00 p.m.
Saturday 11:00 a.m. – 4:00 p.m.

3.1.3 Communication Tools

A variety of communication tools will continue to be employed to share information with and obtain information from the public, as follows:

- **A project Web site (www.tzbsite.com)** has been developed where the public can learn about the project. Visitors can sign up for the mailing list on the Web site and submit comments via e-mail, to the Project Sponsors. The site is updated regularly and includes many project reports and meeting materials.

- **Newsletters** will continue to be produced. Content includes information on the project, visuals (maps and charts), Project Sponsor contact information, and upcoming meeting dates.

- **Open houses** will continue to be hosted. Each open house provides a forum for exchanging information related to the project. At these events, Project Sponsors members provide background information, share new project developments, and solicit the feedback of all stakeholders, particularly the general public. Similarly, stakeholders are able to provide comments for consideration as the project continues.

- **A media outreach effort** will continue to be undertaken to engage all interested parties. This involves engaging the media when there are new project developments to communicate to the public. Communication tools include news releases, project-related documents, visual aids, media briefings, and advertising, all aimed at ensuring maximum public participation in the environmental review process. Additionally, this effort has engaged and will continue to engage media serving low-income and minority communities. Other media-engagement measures will also be applied to ensure that environmental-justice goals are achieved.

- **Environmental Justice and Title VI outreach**, to ensure that all stakeholders have the opportunity to participate fully in this EIS process, the Project Sponsors have developed and will continue to implement in the DEIS phase its Environmental Justice (EJ) Outreach Plan. This EJ Outreach program, a significant aspect of the Project's Public Involvement Plan, is in accordance

with all governing federal, state and local laws and provisions intended to prevent non-discrimination and assure the participation of all members of the community. The Project Sponsors have taken proactive steps to remove the barriers to engaging and accommodating minority, disabled and low-income populations, among other groups, to assure non-discrimination against stakeholders on the basis or color, race, creed, national origin, income, age, sex, and English proficiency.

3.2 Scoping Meetings

As described below, three sets of scoping-related meetings have been conducted for this project:

- Scoping Meetings in January 2003.
- Scoping Update Meetings in February 2008.
- Public Information Meetings in October 2008.

In total, more than 1,300 comments were received from nearly 500 commenters. Individual responses to all of these comments can be found in the *Scoping Comments Report* (May 2009).

3.2.1 Scoping Meetings (2003)

In mid-January 2003, the first set of three Public Scoping Meetings were held: one each in Westchester, Rockland, and Orange Counties, to invite public comment on the scope of the project, including its Purpose and Need and its goals and objectives. Some 282 persons attended the three scoping meetings. In addition, the public was asked to submit suggestions for improvements to the corridor. By the close of the scoping period in March 2003, more than 100 individuals, including representatives of federal and state agencies; elected officials in both state and local government; national and local environmental and community-oriented organizations; as well as many private citizens, submitted more than 150 ideas for improvements to the corridor to the Project Sponsors as part of this process, as well as other comments on the project.

The more than 450 comments that were received addressed a wide range of issues concerning the project, the proposed alternatives, and community concerns of various sorts. Comments fell into four major categories: the choice of a transit mode or modes and related transportation issues; river-crossing solutions; environmental issues; and the environmental review process itself, including public involvement in the process. Transportation issues attracted the largest number of comments – about 43 percent of the total – while environmental concerns accounted for about 23 percent, river-crossing ideas about 21 percent, and comments about the process itself about 13 percent.

3.2.2 Scoping Update Meetings (2008)

The issuance of the revised NOI in February 2008 provided the opportunity for additional public comment on the project as part of the Scoping Update Process. Pursuant to the provisions of SAFETEA-LU Section 6002, the public was invited to participate in the NEPA process, including opportunities to comment on the refined scope of the EIS proposed in the February 2008 NOI. Three Scoping Update Meetings were held, one each in Westchester, Rockland, and Orange Counties.

Each meeting consisted of an informal open-house setting and two formal presentations. After each presentation, the public was provided the opportunity to comment. A court reporter was available to record the formal meeting and public comments, and to take individual comments on a one-on-one basis.

Scoping update materials were provided to federal, state, local agencies and Native American tribes with jurisdiction or interest in the project for their review and comment. The *Scoping Update Packet* (February 2008) was intended to inform participants about the project and the potential features planned for consideration within the EIS. Oral and written comments were accepted during the Public Scoping Update Meetings and through to March 31, 2008, the termination date of the formal comment period.

Comments were received from close to 300 agencies, groups, and individuals, reflecting more than 600 comment entries. A total of 79 comments were made in the open house forums and 541 more were submitted via email, postal mail, or by hand on project comment forms. Comments could be grouped into four major categories: transit mode and related transportation issues, river-crossing solutions; environmental issues; and the environmental review process, including the public's involvement in the process. Transportation issues attracted the largest number of comments (approximately 37 percent of the total), followed by proposed river-crossing solutions (approximately 24 percent), comments about the process itself (approximately 20 percent), and comments on environmental concerns (approximately 19 percent).

A total of 151 comments addressed the choice of transit mode, the majority of which expressed a preference for one transit mode over the others (a description of the alternatives/options can be found in Chapter 4), as follows:

- Approximately 66 percent supported CRT across the corridor and/or a one-seat ride (a trip with no transfers) to New York City (Alternative 4A or Option 4D).
- Approximately 19 percent advocated Light Rail Transit (LRT). These were split between support for Full-Corridor LRT and those who advocate Alternative 4B (CRT in Rockland County and LRT in Westchester County).
- Approximately 16 percent advocated BRT service in the corridor.

Another 132 comments primarily addressed preferences for one or more river-crossing solutions. Of those comments expressing a preference for one river-crossing solution:

- Approximately 61 percent were in favor of building a new bridge to replace the existing Tappan Zee Bridge.
- Approximately 19 percent were in favor of rehabilitating the existing Tappan Zee Bridge.
- Approximately 20 percent were in favor of constructing one or more tunnels to either replace or supplement the existing Tappan Zee Bridge.

3.2.3 Public Information Meetings (2008)

The Project Sponsors also conducted a series of Public Information Meetings in October 2008 to explain the recommendations presented in the *Draft Transit Mode Selection Report* (September 2008) and the *Draft Alternatives Analysis for Rehabilitation or Replacement of the Tappan Zee Bridge* Report (September 2008). A total of 85 commenters submitted a total of 258 comments. Commenters included

representatives of state and local governments and environmental and community groups. Slightly more than three quarters of the commenters were private citizens. The issues of principal concern were similar to those expressed in the earlier comment meetings and periods. The reports were revised based on the comments received.

Comments about transit mode and other transportation issues were predominant, making up 34 percent of the total. Comments about the environment made up approximately 28 percent of the total, followed by comments about the process, approximately 24 percent, and, finally, by river-crossing comments, approximately 15 percent.

3.3 Summary of Scoping Comments and Responses

Comments received at the 2003 and 2008 scoping-related meetings, and during the extended comment periods following the meetings, were made by federal, state and local agencies and elected officials, non-governmental organizations, and members of the general public. As discussed in Subchapter 3.2, the comments covered a wide range of project-related subjects and issues that can be grouped into four major groups – transportation, process, river crossing, and environment. Within these broadly-defined groups, the following six topics are of particular importance, by virtue of either the volume of comments they attracted and/or the general perception that they are of especially crucial interest to the community at large.

3.3.1 Land Use and Transit-Oriented Development

The impacts of the project and their relationship to land use and TOD were of major concern to many county and local planners and stakeholders. Issues such as regional impacts and needs; sprawl and growth-inducing effects; and town and village planning development, especially around new transit facilities, were regularly cited.

Regional impacts and local plans and policies will be addressed as part of the DEIS land use analysis, and meetings will be held with the local communities to address these issues. Additionally, the Project Sponsors recognize the opportunity to advance smart-growth options, and have engaged a TOD consultant to provide TOD training expertise to local communities as part of our planning efforts.

3.3.2 Environmental Review Process

There were many comments that questioned the tiering approach the Project Sponsors and Federal Partners have adopted and expressed concern that the approach will result in project segmentation. There were comments criticizing the selection of a transit mode before all transit mode options have had their impacts to local communities evaluated.

The tiered approach is designed to, among other things, specifically avoid segmentation. Rather, a tiered approach helps the Federal Partners and Project Sponsors to focus on the issues that are ripe for decision and to exclude from consideration issues already decided or not yet ripe. Federal regulations have established that tiering is appropriate under such circumstances (40 CFR § 1502.20).

3.3.3 Transit in the Corridor

Support for public transit in the corridor was widespread, as expressed in the many transit-related comments received.

The Project Sponsors have long recognized the important role transit will play in improving mobility in the corridor. For that reason, there has been extensive planning to determine the most suitable, cost-effective transit system to implement. CRT, BRT, and LRT, with both cross-corridor and Manhattan-bound service plans, have been intensively analyzed, both independently and in combination. Evaluations of the modes were based on established engineering considerations; environmental factors; transportation factors, including ridership forecasts; and cost-effectiveness criteria.

The complete analysis results, along with the basis for the transit modes recommended to be studied in the DEIS, have been published in the *Transit Mode Selection Report* (May 2009) which recommended that full-corridor BRT from Suffern to Port Chester and CRT from Orange/Rockland to GCT be studied in the DEIS. This Tier 1 transit analysis will be conducted as part of a broad evaluation of planning level alternatives and will provide corridor-level decisions regarding transit mode or modes, transit alignments, and logical termini. Station locations will be studied to an appropriate level of detail. The analysis will include evaluation of the following components:

- **Bus Rapid Transit**
  - BRT/HOV/HOT lanes in the I-287 median, from Suffern and across the Tappan Zee Bridge.
  - BRT in a busway in NYSTA ROW in Rockland.
  - BRT integrated into the existing street system in Westchester.
  - BRT in a busway in Westchester.

- **Commuter Rail Transit**
  - CRT in the I-287 median; from Suffern and across the Tappan Zee Bridge, and connecting to the Hudson Line.
  - CRT on the south side of the NYSTA ROW; from Suffern and across the Tappan Zee Bridge, and connecting to the Hudson Line.

3.3.4 The Tappan Zee Bridge

A variety of opinions were expressed on the Hudson River crossing at the Tappan Zee Bridge and the best way to address crossing needs while anticipating the transportation demands of the coming decades. Advocates for rehabilitating the existing Tappan Zee Bridge, for replacing the bridge, and for supplementing the existing bridge with one or more tunnels expressed their views, and provided detailed support for their proposals. Based on the results of the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009) and the *Alternatives Analysis for Hudson River Highway Crossings* (July 2007), a transit-ready replacement bridge was deemed the most reasonable based on the established criteria. Both single- and dual-level bridges will be studied in the DEIS in addition to the No Build Alternative.

3.3.5 Environmental Impacts

A broad range of comments were received regarding the technical environmental analyses to be conducted in the DEIS, including air quality, noise, water quality, ecology (of the Hudson River and in the corridor), wetlands, hazardous materials/waste, land use, environmental justice, cultural resources, and visual and aesthetic impacts. The Project Sponsors will conduct analyses of all relevant environmental impacts related to the proposed highway, bridge, and transit improvements in the DEIS for both construction and operational phases of the project (see Chapter 5). Mitigation measures will be presented for any potential significant adverse environmental impacts.

3.3.6 Highway Improvements

Comments were received regarding highway-related components such as climbing lanes, park-and-ride facilities, interchanges, and the number of highway lanes. Inquiries regarding the methodology to be used to analyze potential traffic impacts were also made.

The proposed highway improvements along I-87/I-287 in Rockland County are intended to improve the safety and operation of the Thruway and incorporate transit. The analyses that will be conducted in the DEIS will use the NYMTC-developed Best Practice Model (BPM) for travel-demand forecasting and *Paramics*, a traffic-simulation model, to analyze traffic impacts and levels of service. The BPM covers the entire NYMTC region. The modeling to be conducted for the DEIS will utilize the latest demographic and socioeconomic forecasts from NYMTC.

The information obtained from these tools will be used to analyze operation of the Thruway, its interchanges, and adjacent arterials for future analysis years if no changes were made, the No Build Alternative, and if proposed improvements are implemented, the Build Alternative. The results of these transportation and other analyses will determine the viability of including HOV/HOT lanes, climbing lanes, interchange additions and improvements, and other potential operational improvements. The analysis will also review locations along the corridor with high accident rates and determine whether improvements are warranted.

4 Range of Alternatives/Options Studied

In accordance with the environmental review process under NEPA, a variety of different alternatives have been developed and considered as part of the scoping process. These alternatives included a range of different transportation modes and facilities in a variety of locations, configurations and combinations. During scoping, the public and agencies were given the opportunity to comment on the alternatives considered in accordance with SAFETEA-LU Section 6002. Some of the alternatives identified did not meet the Project Purpose and Need and therefore have been eliminated from further consideration. Others have been retained for further evaluation in the DEIS as described in this chapter.

The development of the proposed DEIS alternatives occurred in several steps:

- The AA process, which involved Level 1 and Level 2 screening processes using transportation, environmental, engineering, and cost criteria, resulted in the identification of six preliminary DEIS alternatives.

- In the process of analyzing these six preliminary alternatives, several additional options were developed.

- Level 3 screening was used to narrow the range of alternatives/options under study in order to recommend (1) a transit mode or modes, and (2) which bridge options were reasonable alternatives to be carried into the DEIS. The alternatives/options were evaluated in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009) and the *Transit Mode Selection Report* (May 2009), resulting in a revised set of alternatives for study in the DEIS.

Alternatives and options were considered for the river crossing, highway, and transit. Evaluation of the river crossing included consideration of type of crossing (bridge or tunnel) and alignment of such facilities. Evaluation of the highway included consideration of general purpose lanes, HOV and HOT lanes. Three transit modes were evaluated: BRT in conjunction with HOV/HOT lanes, CRT, and LRT:

- **Bus Rapid Transit** - BRT is a limited-stop, rapid bus service that can operate on different types of travelways:

  - **Busway**: is a barrier-separated facility into which unauthorized vehicles cannot enter; it is only accessible to buses.
  - **Bus lane**: a dedicated lane on a local arterial and does not have a barrier separation; vehicles could enter a bus lane, if warranted, as there is no physical barrier.
  - **HOV/HOT lanes**: buses could operate with HOVs in shared use lanes.

  BRT routes typically operate along a main trunk line, with service every 5 to 10 minutes during peak periods. Stations are similar to rail stations, with level boarding from the platform, and can have rapid boarding systems, such as multiple doors (also similar to rail). BRT utilizes intelligent transportation system (ITS) technology, transit-signal priority, convenient and rapid fare collection, frequent service, and close integration with land use in order to enhance the bus system's performance.

- **Commuter Rail Transit** - CRT generally connects suburban communities with the central business district. Trains are typically powered by diesel or electricity. Stations are typically

several miles apart and speeds can reach up to 90 miles an hour. Within the corridor, commuter rail service currently operates on five lines: the Port Jervis Line, the Pascack Valley Line, the Hudson Line, the Harlem Line, and the New Haven Line.

- **Light Rail Transit** - LRT is a passenger rail system operating along a grade-separated, fixed-rail ROW or in a street ROW adjacent to or shared with traffic. Systems are generally single- or multiple-car trains with station-level or street-level boarding capabilities. LRT is more flexible than CRT, as it can travel through city streets, thereby serving neighborhoods more directly.

4.1 Alternatives Analysis Process

The Alternatives Analysis for the corridor has followed a three-step process, as described below.

4.1.1 Level 1 and Level 2 Screening

The *Alternatives Analysis Report* published in January 2006 described the two cycles of alternatives screening (Level 1 and Level 2) that were conducted (Figure 4-1). In Level 1 screening, a "long list" of 150 alternative elements was identified, and the elements were analyzed and evaluated according to a set of selection criteria. The key criteria used in the screening process included corridor mobility; projected ridership; cost-effectiveness; operational aspects; capital and operating/maintenance costs; engineering and constructability considerations; and environmental impacts.

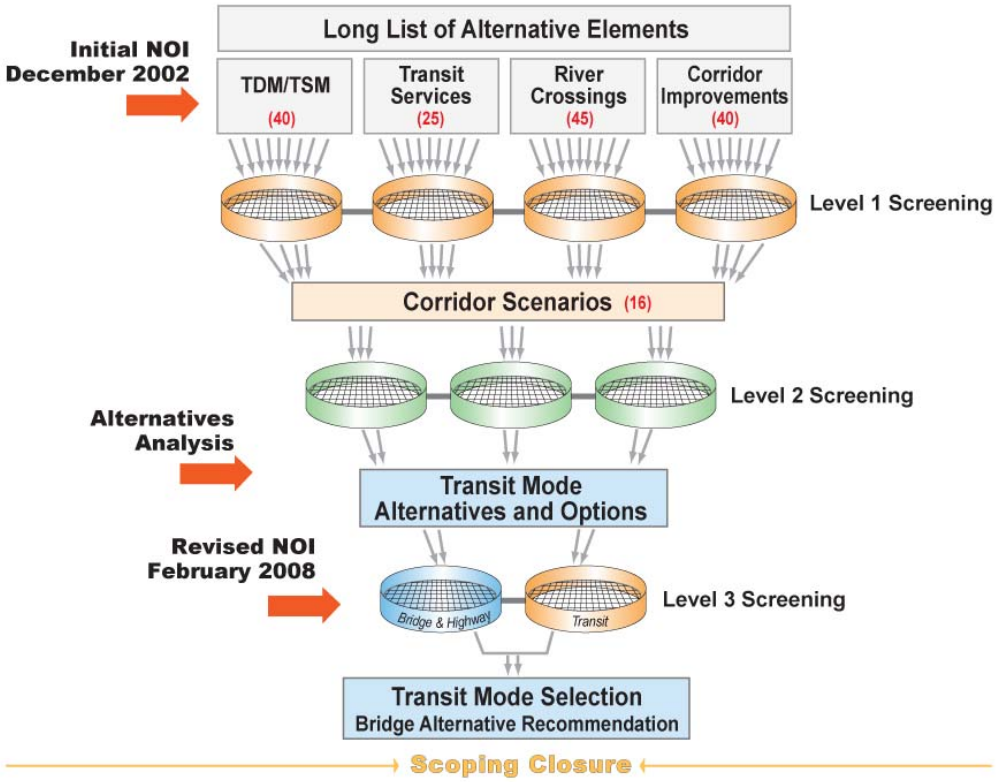

Figure 4-1 Screening Process

The 72 alternative elements that survived Level 1 screening were combined into 16 corridor-wide scenarios that represented combinations of the elements that met the goals and objectives of the project for TDM/TSM, highway, transit and river-crossing options. The corridor-wide scenarios were subjected to a Level 2 screening process using the criteria described above. After the conclusion of the Level 1 and Level 2 screening process, several options – among them, a highway/rail tunnel – were eliminated due to not meeting Level 1 and Level 2 criteria. Level 2 screening resulted in six alternatives:

- **Alternative 1** – No Build (a NEPA requirement).
- **Alternative 2** – Rehabilitated Bridge with TDM/TSM Measures.
- **Alternative 3** – Full-Corridor BRT.
- **Alternative 4A** – Full-Corridor CRT.
- **Alternative 4B** – Manhattan-Bound CRT with LRT in Westchester County.
- **Alternative 4C** – Manhattan-Bound CRT with BRT in Westchester County.

In addition, variations/enhancements of these six alternatives were developed based on comments received from the public and on other studies conducted throughout the environmental review process. These are Option 3A (an enhancement of Alternative 3), Option 3B (a variation of Option 3A), Option 4A-X (a variation of Alternative 4A without a direct connection to the Hudson Line), and Option 4D (a variation of Alternative 4C). A brief description of each alternative and option as proposed within the corridor is provided below.

The build alternatives/options 3, 3A, 3B, 4A, 4B, 4C, and 4D all share a number of common elements. The fundamental differences among the alternatives are the transit modes. The common elements include the following:

- **Highway** – Six general-purpose lanes, two BRT/HOV/HOT lanes, a westbound climbing lane from the Tappan Zee Bridge to Interchange 14A, and a new eastbound climbing lane from Interchange 12 to Interchange 11 in Rockland County.

- **TDM/TSM Measures** – Potential TDM/TSM measures include ramp metering and congestion pricing.

- **NYMTC Transportation Improvement Program (TIP)** – Proposed projects for the corridor included in the TIP (FY 2008-2012). The TIP is the official listing of approved transportation projects in the region, from ongoing Tappan Zee Bridge maintenance projects to highway and transit projects.

- **River Crossing** – A river crossing with two BRT/HOV/HOT lanes, eight general-purpose lanes, shoulders, transit accommodation, and a full-length pedestrian/bicycle path linking Rockland and Westchester Counties.

4.1.2 Description of Preliminary DEIS Alternatives/Options

4.1.2.1 AA No Build Alternative

Consistent with NEPA requirements, a No Build Alternative will be analyzed in the DEIS. There are several key components of the No Build Alternative. The first includes the maintenance of the bridge structure and highway to avoid unacceptable levels of deterioration that would lead to operational and

safety deficiencies. Second, the No Build would include the proposed projects listed in the TIP FY 2008-2012, including highway improvements in Westchester County. The potential impacts of this alternative were studied in the *Alternatives Analysis Report* (January 2006), which contained a discussion of why the No Build scenario would not meet the Purpose and Need and the goals and objectives established for the project.

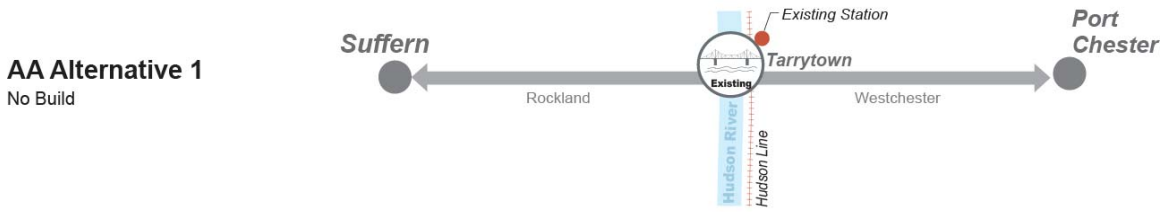

Figure 4-2

4.1.2.2 AA Alternative 2 – Bridge Rehabilitation with TDM/TSM Measures

As originally conceived for Alternative 2, the bridge would be retained and structurally rehabilitated to include the retrofit measures necessary to bring it into compliance with the current seismic criteria. However, the existing conditions, such as narrow lanes, no shoulders, and the movable barrier for the seven-lane bridge, would remain. In addition, half of the bridge (the causeway section) would have to be entirely replaced. TDM/TSM measures, such as ramp metering and congestion pricing, along with projects in the TIP FY 2008-2012, will also be included in this alternative (and all build alternatives).

When completed, however, this alternative would result in ongoing high maintenance costs, traffic disruptions, and traffic-safety issues. Importantly, this alternative also has no provision for a transit mode. Thus, Alternative 2 did not meet the Purpose and Need and goals and objectives of the project. Consequently, after the *Alternatives Analysis Report* (January 2006) was completed, the Project Sponsors developed a series of options for rehabilitation or replacement of the bridge and subjected them to a Level 3 screening analysis (Subchapter 4.4). Alternative 2 as presented here was dropped from further study.

Figure 4-3

4.1.2.3 AA Alternative 3 – Full-Corridor BRT with a New Bridge and Highway Improvements in Rockland

The transit component of Alternative 3 includes BRT between Suffern and Port Chester, with connections to the Tarrytown Station. Buses would use HOV/HOT lanes in Rockland County, a barrier-separated facility (busway) in portions of Westchester County (alongside I-87/I-287), and bus lanes on NY Route 119 in Tarrytown and White Plains. Service connections would be possible to the Port Jervis, Pascack Valley, Harlem, and New Haven Lines.

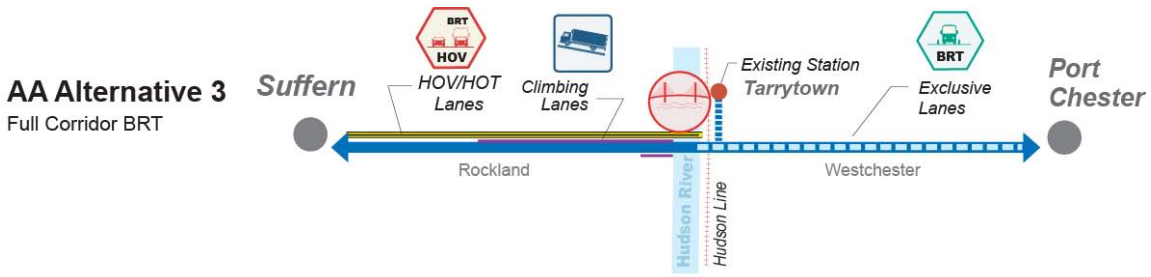

Figure 4-4

4.1.2.4 AA Option 3A – Full-Corridor BRT

Option 3A is an enhancement of original Alternative 3. Option 3A would provide BRT service between Suffern and Port Chester. The alignment provides a trunk route, primarily along I-287, that is intended to operate like a rail system. The trunk would extend from Suffern to Port Chester, connecting the NJTransit Suffern Station to the Port Chester New Haven Line Station. In Rockland County, the BRT trunk line would operate on a section of the Piermont Railroad ROW in Suffern and in HOV/HOT lanes within the NYSTA ROW. Through Westchester County, the BRT trunk line would operate in a combination of busways and bus lanes.

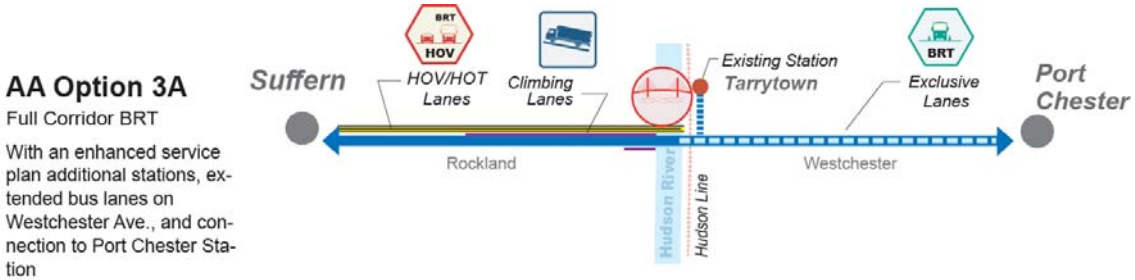

Figure 4-5

4.1.2.5 AA Option 3B – Full-Corridor BRT with Westchester Busway

Option 3B is a variation of Option 3A. Option 3B would provide BRT service between Suffern and Port Chester. In Rockland County, BRT would operate on a section of the Piermont RR ROW in Suffern and in HOV/HOT lanes along I-287 and across the Tappan Zee Bridge. Through Westchester County, BRT would operate on a busway along I-287 to Port Chester. Service would also be provided through White Plains in bus lanes. BRT on the busway in this option would operate at high speeds and have extensive feeder-bus connectivity. There would be minimal interference from the general-purpose traffic.

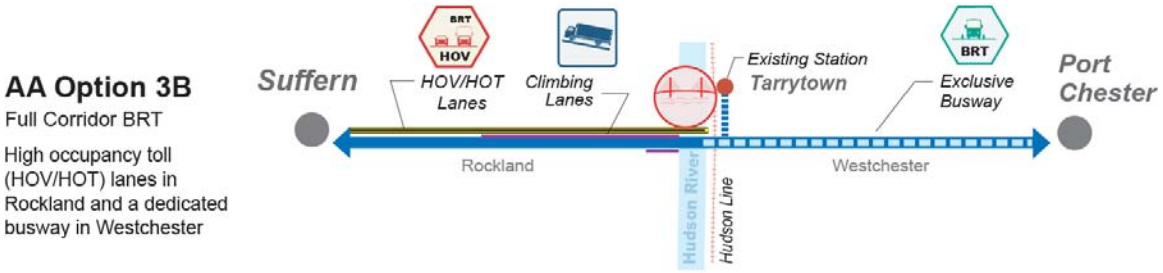

Figure 4-6

4.1.2.6 AA Alternative 4A – Full-Corridor CRT with a New Bridge and Highway Improvements in Rockland

Alternative 4A would provide CRT service between Suffern and Port Chester, with a direct connection to the Hudson Line for a one-seat ride from Rockland County to GCT in Manhattan. Across Westchester County, service would extend from a new Tappan Zee Station in Tarrytown to Port Chester, with transfer capability to the Harlem Line and a direct connection to the northbound New Haven Line.

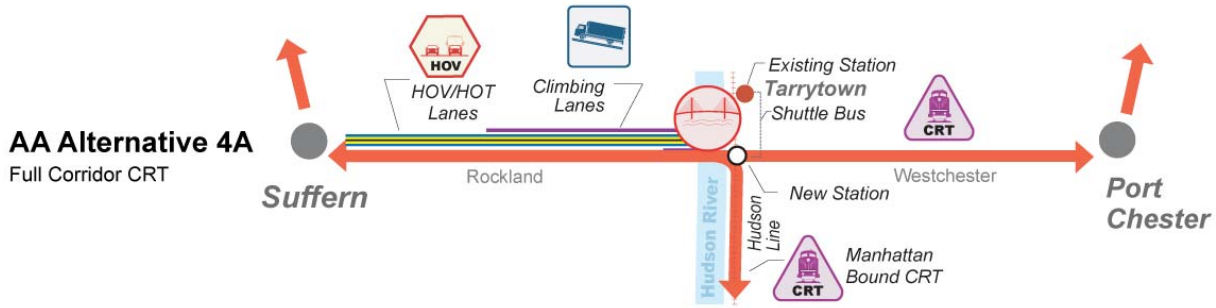

Figure 4-7

4.1.2.7 AA Alternative 4B – Manhattan-Bound CRT with LRT in Westchester County with a New Bridge and Highway Improvements in Rockland

Alternative 4B would provide CRT service between Suffern and a new Tappan Zee Station in Tarrytown. CRT would begin in Suffern with a direct connection to the Port Jervis Line and connect into the Hudson Line for a one-seat ride to GCT in Manhattan. LRT service would begin from the Hudson Line Tarrytown Station and continue through Westchester County to Port Chester, with a transfer to the New Haven Line. It would follow a high-speed alignment along I-287 in Greenburgh, proceed on local arterials through White Plains, and return to a high-speed alignment along I-287 for the connection to the Port Chester Station.

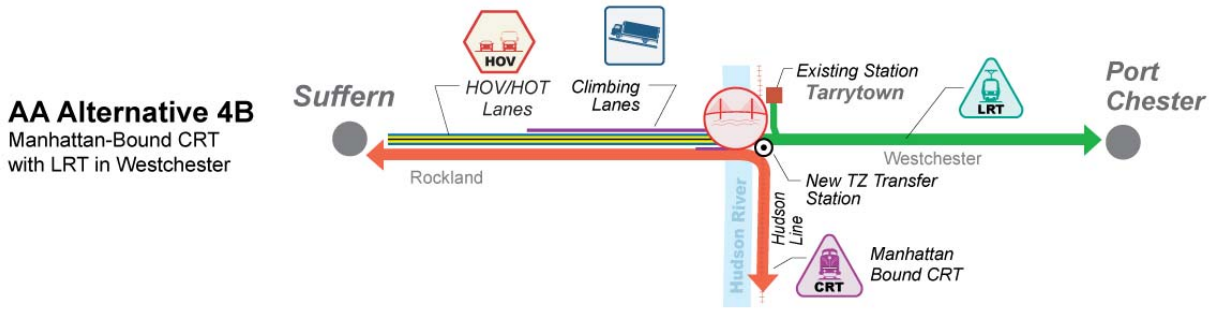

Figure 4-8

4.1.2.8 AA Alternative 4C – Manhattan-Bound CRT with BRT in Westchester County with a New Bridge and Highway Improvements in Rockland

Alternative 4C would provide CRT service between Suffern and a new Tappan Zee Station in Tarrytown. CRT would begin in Suffern with a direct connection to the Port Jervis Line and connect into the Hudson Line for a one-seat ride to GCT in Manhattan. BRT service through Westchester County would begin from a Tarrytown Station to Port Chester, with transfers to the Harlem and New Haven Lines. Buses would travel within a barrier-separated facility (busway) along I-287 in Greenburgh and in bus lanes on NY Route 119 in Tarrytown and White Plains. Service east of White Plains to Port Chester would be on local arterials.

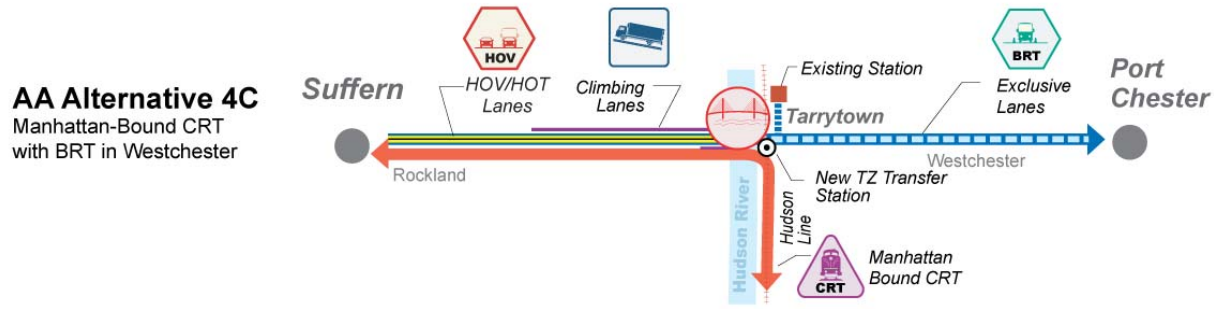

Figure 4-9

4.1.2.9 AA Option 4D – CRT in Rockland with Full-Corridor BRT

Option 4D is a variation of Alternative 4C and Option 3A. It was an optimal solution to serve both the cross-corridor and the New York City market. Option 4D would provide CRT service between Suffern and GCT in Manhattan as well as BRT service between Suffern and Port Chester. CRT would begin in Suffern with a direct connection to the Port Jervis Line and connect into the Hudson Line for a one-seat ride to GCT. BRT service would begin in Suffern across Rockland County along I-287 and continue through Westchester County to Port Chester as in Option 3A, with transfer capability to the Harlem and New Haven Lines.

AA Option 4D
Manhattan-Bound CRT with full corridor BRT (as in Alt 3A) but with no Airmont or Tappan Zee CRT Stations

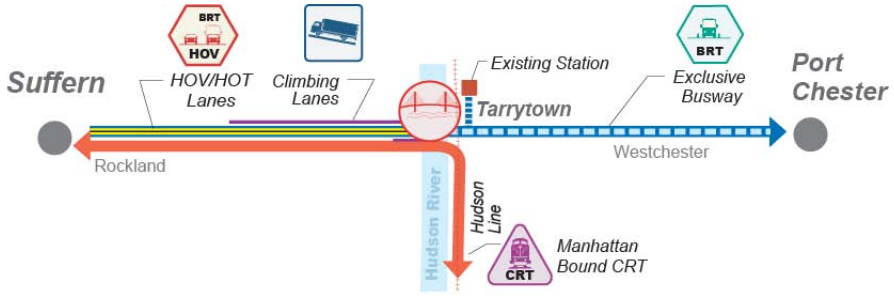

Figure 4-10

4.1.3 Level 3 Screening

As the study progressed and more information was obtained, Project Sponsors initiated a third level of screening. The Level 3 screening was used to determine which alternatives would be further studied in the DEIS.

The *Transit Mode Selection Report* (May 2009), describes the process that compared the three modes (CRT, LRT, and BRT) based on transportation, environmental, and cost criteria. The criteria utilized in the transit mode selection build upon the existing technical work, supplemented by additional studies conducted throughout the project. This screening process led to the determination of the modes that best meet the Project Purpose and Need. It also enabled comparisons among the modes to determine whether there were major differentiators and whether there are any critical issues associated with a mode. Finally, it determined whether any mode fails to meet the goals and objectives and should therefore be eliminated from further consideration in the DEIS. The results of these analyses are presented in the *Transit Mode Selection Report* (May 2009), which is incorporated by reference and is summarized in Subchapter 4.2.

To determine which bridge rehabilitation and replacement options were reasonable options to be further studied in the DEIS, a series of potential options was developed and evaluated using the relevant engineering, environmental, transportation, and cost criteria developed for the Level 1 and Level 2 screenings. Options for the rehabilitated bridge included allowance for the transit modes that will be considered in the Tier 1 transit analysis on a rehabilitated and widened bridge and/or a supplemental structure. Options for the replacement bridge also encompassed the range of transit modes in the Tier 1 transit analysis on single- or dual-level structures. The results of these analyses are presented in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009), which is incorporated by reference and summarized in Subchapter 4.4 of this report.

4.2 Transit Mode Selection

This subchapter summarizes the results of the *Transit Mode Selection Report* (May 2009), which documented the in-depth analysis, evaluation, and public and agency participation that led to a transit mode recommendation that best meets the Project Purpose and Need, goals, and the long-term public interest. The range of alternatives/options evaluated in the report includes the alternatives and options described in Subchapter 4.1.2, as well as a version of Alternative 4A (4A-X with no direct connection to the Hudson Line) and a re-examination of cross-corridor LRT.

4.2.1 Transit Mode Criteria Evaluated

Transportation, environmental, and cost criteria were developed in order to assist in making the transit mode decision. These criteria were derived from the evaluation criteria developed in the AA process. The criteria were presented at the Scoping Update Meetings in February 2008 and at a number of SAWG meetings. In the evaluation of transit modes, four transportation evaluation criteria, eight environmental evaluation criteria, and five cost evaluation criteria were used:

The four transportation evaluation criteria were:

- Transit ridership
- Capacity
- Transit travel time
- Roadway congestion

The eight environmental evaluation criteria were:

- Consistency with land use plans
- Transit-oriented development potential
- Parklands and recreational areas
- Hudson River habitat disturbance
- Wetlands
- Residential and commercial acquisitions and displacements
- Historic and archaeological resources
- Air quality and energy

The five cost evaluation criteria were:

- Capital costs
- Annual operating costs
- Fare revenue
- Costs/net costs per passenger and per passenger-mile
- Transit travel-time benefits

Many of the criteria used in the evaluation were not differentiators, that is, the results were not sufficiently different among the alternatives/options to be used as a basis for choosing one mode over another. Thus, while all are important criteria for full evaluation in the DEIS, their analytic roles in the ranking of one particular transit mode relative to the others turned out to be minimal. Regional roadway congestion, for example, is not a differentiator among transit modes, because all of the transit alternatives/options result in lower total vehicle miles traveled (VMT) than the No Build conditions but the range of differences between them is small, as none is more than one to two percent greater than any other.

4.2.2 Transit Mode Analysis Results

The results of the analyses are summarized in Table 4-1. In general, environmental factors were not differentiators, costs were greater for modes that included CRT, and cost-effectiveness was better for those modes that included BRT. Travel-time savings were most dramatic in those modes that provided a means of avoiding congestion for the greatest number of travelers, whether rail or bus. Travel-time savings across the corridor were generally greater than were time savings to Manhattan.

The transit mode analyses concluded that:

- **Option 3A** (Full-Corridor BRT Enhanced) had the lowest capital cost, the lowest operating cost, the lowest net annual transit cost, the lowest net cost per passenger, and the lowest net cost per passenger-mile. However, Option 3A also had the lowest annual passenger miles and was in the bottom third for weekday daily ridership compared to the rail alternatives, with the exception of the LRT alternative.

- **Option 3B** (Variation of Option 3A) closely trailed Option 3A in all categories, having slightly higher costs (capital and operating, overall project, and transit-only), fewer passengers or passenger miles, and a higher net cost per passenger and per passenger-mile. Option 3B is, however, substantially ahead of the other alternatives/options on these measures. As with Option 3A, Option 3B provides far fewer ridership or passenger-mile benefits than the other transit alternatives.

- **Alternative 4A** (Full-Corridor CRT) had the highest cost of the alternatives in terms of capital costs, operating costs, and annual project costs and annual transit costs, while delivering the most passenger miles and ridership benefits in the upper range of all alternatives/options. The cost per passenger was high (second-highest of all alternatives) but the net cost per passenger-mile was in the mid range of the alternatives/options.

- **Option 4A-X** (Full-Corridor CRT without a Hudson Line Connection) was the second-most costly alternative after Alternative 4A in terms of capital costs, but was substantially lower cost in terms of operating costs, coming in the bottom third of the range on project and transit operating costs. It had the highest net cost per net passenger and the highest cost per passenger-mile. It also had the lowest number of new riders and total riders and the second lowest number of diverted riders, the second-lowest travel-time benefits, and the fewest annual passenger miles on new facilities.

- **Alternative 4B** (Manhattan-Bound CRT with LRT in Westchester County) was mid-range in capital cost measures but was in the upper third on operating costs. Alternative 4B was in the mid range on weekday daily ridership and on the high end of the range for passenger-miles. Alternative 4B was in the mid range on net cost per passenger and per passenger-mile.

- **Alternative 4C** (Manhattan-Bound CRT with BRT in Westchester County) was in the mid range in capital cost measures but had the third-highest operating cost. It had the highest annual passenger miles on existing facilities of the alternatives. It also had the second-highest daily ridership, the third-highest annual passenger-miles, and was tied with Alternative 4B for the most annual passenger miles on existing facilities. In terms of the net cost per passenger and the net cost per passenger-mile, Alternative 4C was in the bottom third.

Table 4-1

Transit Cost Related Criteria

Criterion	Mode by Alternative/Option							
	BRT		CRT		LRT/CRT	BRT/CRT		LRT
	3A Full-Corridor BRT Enhanced	**3B** Full-Corridor BRT, HOV/ HOT Lanes in Rockland, Busway in Westchester	**4A** Full-Corridor CRT with Hudson Line (HL) Connection	**4A-X** Full-Corridor CRT without HL Connection	**4B** CRT in Rockland, HL Connection, LRT in Westchester	**4C** CRT in Rockland, HL Connection, BRT in Westchester	**4D** CRT in Rockland, HL Connection, Full-Corridor BRT (3A)	Full-Corridor LRT
Transit Capital Cost ($ Millions)	897	2,548	15,111	13,022	10,372	8,775	8,869	5,561
Annual Transit Costs ($ Millions)	140	266	1,389	1,105	974	901	911	483
Fare Revenue ($ Millions)	40	39	105	34	98	113	127	27
Net Annual Transit Costs ($ Millions)	100	227	1,284	1,071	876	788	784	456
Travel-Time Benefits ($ Millions)	110	112	184	97	154	149	202	95
Weekday Daily Ridership								
New	23,400	23,800	21,800	13,800	21,000	21,400	31,200	16,900
Diverted From Other Transit Routes	30,600	29,800	40,100	23,100	32,200	44,800	48,700	21,400
Total	54,000	53,600	61,900	36,900	53,200	66,200	79,900	38,300
Annual Passenger-Miles (Millions)								
In Corridor	100	90	190	80	160	176	207	90
On Existing Facilities Beyond Corridor	40	60	360	120	340	346	332	100
Total	140	150	550	200	500	522	539	190
Cost per Passenger	$8.92	$17.03	$77.16	$103.23	$62.87	$46.68	$39.08	$43.51
Net Cost per Passenger	$6.39	$14.55	$71.36	$100.13	$56.52	$40.81	$33.66	$41.13
Cost per Passenger-Mile*	$1.00	$1.77	$2.53	$5.52	$1.95	$1.73	$1.69	$2.54
Net Cost per Passenger-Mile	$0.72	$1.51	$2.34	$5.36	$1.75	$1.51	$1.45	$2.40

*Notes: Based on Year 2012 dollars. Net cost per passenger-mile is calculated based on total passenger-miles (in-corridor and on existing facilities beyond corridor).

- **Option 4D** (Variation of Alternative 4C) was in the mid-range for all costs, both capital and operating. It was highest in travel-time benefits, fare revenue, new ridership, and total riders. It was second-highest in total annual passenger miles and had the most annual passenger-miles on new facilities of all the alternatives/options. Option 4D's net cost per passenger was the third lowest and its net cost per passenger-mile the second lowest of all the alternatives/options.

- **Full-Corridor LRT** was in the bottom third of the alternatives/options in terms of capital costs. Its operating costs were the second lowest of the alternatives. It had the lowest fare revenue and lowest travel-time benefits of all the alternatives, the second-lowest total weekday daily ridership, and was among the lowest in annual passenger-miles (on new facilities, on existing facilities, and total). Full-corridor LRT had a mid-range net cost per passenger and was the second highest in net cost per passenger-mile.

4.2.3 Transit Mode Recommendation

Full-corridor BRT in combination with CRT from Suffern connected to the Hudson Line (Option 4D in Table 4-1) is the recommended transit mode because that combination best meets present and future travel demand and mobility needs. The combined BRT/CRT mode provides the most flexibility to accommodate many markets, especially the key cross-corridor and New York City travel markets. The BRT/CRT recommendation is the transit solution that will fulfill the goals of this study by:

- Meeting corridor travel demand needs.
- Minimizing environmental impacts.
- Contributing to sustainable transportation and land use.
- Providing a flexible and adaptable transportation system with excess capacity to meet changing needs in the corridor.
- Enhancing quality of life in an energy-efficient and cost-effective manner.

4.3 Tunnel River Crossing

The process of determining the type of river crossing for a highway and CRT was conducted in two steps:

- **Highway Crossing**: An analysis was conducted of the impacts of building a highway bridge vs. a highway tunnel (*Alternatives Analysis for Hudson River Highway Crossing*, July 2007). Using the Level 2 Screening described earlier, it was concluded that the Bridge Option would provide the more cost-effective highway improvement that meets the Project Purpose and Need. The visual impacts of massive ventilation structures at the shoreline, the extensive property acquisition for tunnel portals including a major portion of Talleyrand Swamp, the degraded highway performance due to steep tunnel grades and loss of interchange connectivity, and the substantial construction costs led to the recommendation that the Highway Tunnel Option should not be carried forward into the DEIS.

- **Commuter Rail Crossing**: An analysis was conducted to address the type of Hudson River crossing that should be constructed for those build alternatives that include CRT (*Alternatives Analysis for Commuter Rail Hudson River Crossing*, September 2005). Again, using the Level 2 Screening Criteria described earlier, the analyses resulted in the conclusion that the sole significant distinguishing benefit of the Tunnel Option would be its provision for greater ease of

transfers at an expanded Tarrytown Station, making this option more attractive for riders from minor markets. However, this benefit would be greatly outweighed by its major disadvantages, most notably greater cost, higher risk, and greater environmental impacts including property displacements and construction impacts. The Tunnel Option's transportation benefit would be further outweighed by the greater ridership, local traffic improvements in Tarrytown, and the engineering and security advantages generated by the Bridge Option. For these reasons it was recommended that the CRT Tunnel Option be eliminated from further consideration in the DEIS.

4.4 Bridge Alternative Screening

This subchapter summarizes the results of the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009), which documented the in-depth analysis, evaluation, and public and agency participation that led to a bridge rehabilitation/replacement recommendation that best meets the Project Purpose and Need, goals, and the long-term public interest.

4.4.1 Tappan Zee Bridge Criteria Evaluated

Evaluation criteria (Table 4-2) and options to be considered were established. Outline designs for both the rehabilitation and replacement options were developed for analysis. The analysis methods and preliminary results for the foundation design for both rehabilitation and replacement options were presented for comment at the Tappan Zee Bridge Foundation Workshop held in March 2008. The workshop consisted of four experts in the fields of foundations, bridge engineering, and construction to provide an independent review of the work developed by the Project Sponsors. The panel unilaterally agreed that the approach and methodology to the seismic analysis of the foundations were reasonable and appropriate for this stage of the project.

Table 4-2

Evaluation Criteria for Bridge Rehabilitation and Replacement Options

Engineering	Environmental	Transportation	Cost
Structural Integrity	Land Use	Travel Time	Capital Cost
Vulnerability	Displacements & Acquisitions	Roadway Congestion	Operating & Maintenance Cost
Seismic	Historic & Archaeological Resources	Alternative Modes in Mixed Traffic	Life-Cycle Cost
Redundancy	Parklands & Section 4(f)/6(f)	Mode Split	
Emergency Response	Ecosystems & Water Resources	Transit Ridership	
Navigation	Visual Resources & Aesthetics	Non-Vehicular Travel	
Construction Impacts		Reserve Capacity	
Life Span		Rail Freight	
		Transportation System Integration	

4.4.2 Tappan Zee Bridge Rehabilitation and Replacement Options

To address the range of issues in the evaluation of rehabilitation and replacement of the bridge, seven representative options were identified for evaluation – four rehabilitation options and three replacement options (Table 4-3 and Figure 4-11) – using the comprehensive set of criteria in Table 4-2.

Table 4-3

Rehabilitation and Replacement Options

Option		Highway			Dedicated Transit	Bicycle & Pedestrian Facilities	Bridge Arrangement
		General Lanes	Shoulders	BRT/HOV/ HOT Lanes			
Rehab	1	7	-	-	-	✓	As existing, but with replaced causeway
	2	8	4	2	BRT	✓	Single-level supplemental; existing structure strengthened and widened and causeway replaced
	3	8	4	2	BRT	✓	Parallel single-level structure added and causeway replaced
	4	8	4	2	CRT	✓	Dual-level parallel structure added and causeway replaced
Replace	1	8	4	2	BRT	✓	Two new single-level parallel structures
	2	8	4	2	CRT	✓	Three new single-level parallel structures
	3	8	4	2	CRT	✓	Two new dual-level parallel structures

With the exception of Rehabilitation Option 1, all options were arranged in an attempt to comply with the Project Purpose and Need, which included compliance with applicable codes and standards, dedicated transit and safety improvements. These options differed only in the form of dedicated transit and bridge arrangement. Rehabilitation Option 1 may best be described as the minimum rehabilitation option. This option did not fully comply with the Project Purpose and Need, as it would retain the existing Tappan Zee Bridge transport capacity (seven lanes) and conditions (no shoulders), but would bring the bridge into compliance with current structural standards as much as possible. No provision for dedicated transit was included, and safety improvements such as shoulders would not be provided.

All rehabilitation options include the replacement of the 166 causeway spans representing approximately half of the overall length of the bridge. Replacement of the causeway is the only reasonable option in light of the ongoing maintenance requirements, rate of deterioration, repeating deterioration cycles, extent of seismic modifications, structural unreliability, and future maintenance risks associated with the existing timber piles.

Rehabilitation Option 1
Same as existing but with replaced causeway

7 General purpose lanes
1 reversible lane as existing
1 Ped & Cycle path

Rehabilitation Option 2
Existing structure strengthened & widened both sides to fit Alternative 3 components and causeway replaced
8 General purpose lanes
2 BRT/HOV/HOT lanes
2 Ped & Cycle paths

Rehabilitation Option 3
Parallel structure added to fit Alternative 3 components and causeway replaced
8 General purpose lanes
2 BRT/HOV/HOT lanes
2 Ped & Cycle paths

Rehabilitation Option 4
Parallel structure added to fit Alternative 4(A,B,C,D) components and causeway replaced)
8 General purpose lanes
2 BRT/HOV/HOT lanes
2 CRT tracks
2 Ped & Cycle paths

Replacement Option 1
Two new parallel structures added to fit Alternative 3 components on a single level
8 General purpose lanes
2 BRT/HOV/HOT lanes
2 Ped & Cycle paths

Replacement Option 2
Three new parallel structures added to fit Alternative 4(A,B,C,D) components on a single level
8 General purpose lanes
2 BRT/HOV/HOT lanes
2 CRT tracks
2 Ped & Cycle paths

Replacement Option 3
Two new dual-level parallel structures added to fit Alternative 4(A,B,C,D) components on two levels
8 General purpose lanes
2 BRT/HOV/HOT lanes
2 CRT tracks
2 Ped & Cycle paths

Figure 4-11 Rehabilitation and Replacement Options for the Tappan Zee Bridge

4.4.3 Tappan Zee Bridge Evaluation Results

The results of the evaluation indicated substantive similarities among the options, particularly regarding environmental impacts and capital cost. While initially unexpected, this outcome was a consequence of the extensive modifications necessary to the existing bridge in the rehabilitation options to satisfy the structural integrity and seismic criteria. As a result, the scale and extent of construction required in the rehabilitation options was similar to the replacement options, leading to similar environmental impacts and costs (Table 4-4).

Table 4-4

Cost Estimates for Rehabilitation and Replacement Options

	Cost Estimates (Millions)						
	Rehabilitation Options				Replacement Options		
	1	2	3	4	1	2	3
Dedicated transit provisions	None	BRT	BRT	CRT	BRT	CRT	CRT
Capital Cost	$3,400	$6,400	$5,100	$6,300	$5,200	$6,400	$6,600
Present Value (150-year) Maintenance Cost	$1,100	$1,500	$1,200	$1,400	$700	$700	$900
Life-Cycle Cost	$4,500	$7,900	$6,300	$7,700	$5,900	$7,100	$7,500
Note: Estimates in Year 2012 dollars.							

Similarly, with the exception of Rehabilitation Option 1, evaluation of the Transportation Criteria again resulted in similar performance across all rehabilitation and replacement options with the same transit mode – BRT or CRT. In Rehabilitation Option 1, the absence of shoulders and dedicated transit resulted in inferior performance and continuing traffic-safety concerns compared to all other options.

Notable differences between the rehabilitation and replacement options did result from the engineering and cost criteria, as identified in the following specific criteria: redundancy; construction impacts; life span; operating and maintenance cost; and life-cycle cost. Overall, evaluation of these criteria identified inferior performance in the rehabilitation options compared to the replacement options.

The preliminary Section 106 effects analysis concluded that Rehabilitation Options 1 through 4 would adversely affect the vast majority of the contributing structural elements of the bridge. These options could not be undertaken in accordance with the Secretary of the Interior's Standards for Rehabilitation. All replacement options have an adverse effect under Section 106 and therefore are a use under Section 4(f).

The preliminary Section 4(f) effects analysis concluded that there are no reasonable and prudent avoidance alternatives to use of the Tappan Zee Bridge. The four rehabilitation options require use of the bridge and cannot be implemented in accordance with the Secretary of the Interior's Standards for

Rehabilitation. Furthermore, as Replacement Option 1 does not provide for CRT (CRT is part of the transit mode recommendation), that option will not be pursued further.

The preliminary Section 106 and 4(f) analysis was presented to SHPO at a meeting on October 16, 2008. The SHPO indicated that the analysis clearly makes the case that rehabilitation is not preferred for the project and indicated its understanding that the bridge must be replaced, and that the Section 106 process will be adhered to as the project advances.

In summary, the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009) concluded that rehabilitation options are not reasonable or prudent and should be eliminated from further consideration in the DEIS.

4.4.4 Tappan Zee Bridge Recommendation

Based on the results of the assessment of each of the options relative to all of the evaluation criteria, and on overall compliance with the Project Purpose and Need, the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009) recommended that both Rehabilitation Options 1 and 2 be eliminated from further consideration and not progressed into the DEIS. While analysis has shown that the existing Tappan Zee Bridge can be rehabilitated to generally comply with standards, the extent of the necessary alterations is extraordinary. These alterations would result in a structure that is 80 percent the same as a replacement option, with similar environmental impacts, traffic and transit operations, and cost. To retain the remaining 20 percent in a rehabilitated bridge with its complex, risk-inherent retrofits, inferior engineering performance, and greater life-cycle costs compared to a replacement bridge was judged to be unreasonable or imprudent.

- Elimination of Rehabilitation Option 1 was recommended because of its non-compliance with the Project Purpose and Need. As identified in the engineering and transportation criteria, this option neither improves mobility, nor maximizes flexibility or adaptability for the long term, nor improves safety or security.

- Elimination of Rehabilitation Option 2 was recommended because the risks associated with construction and maintaining traffic safety, particularly at the main spans, render this option infeasible. Further, the option is not considered reasonable, as a result of the potentially unsafe driving conditions where traffic is separated around the existing main spans' truss. It also bears greater capital costs, greater construction risks, and substantially longer construction duration when compared to Rehabilitation Options 3 and 4.

Based on the assessment of the remaining Rehabilitation Options (3 and 4) using all the evaluation criteria, rehabilitation of the Tappan Zee Bridge was determined to be not reasonable for the reasons outlined below:

- Rehabilitation Options 3 and 4 require substantial modifications to the existing bridge to comply with the structural integrity and seismic criteria.
- Eighty percent of the final Tappan Zee Bridge in Rehabilitation Options 3 and 4 is new and is exactly the same as that of the Replacement Options.
- Rehabilitation and replacement options have similar environmental impacts.
- Rehabilitation and replacement options have the same transportation performance.
- Rehabilitation and replacement options have similar capital costs.
- The replacement options have better engineering performance.

- The replacement options have substantially lower maintenance costs.
- The rehabilitation options have greater construction risks and unknowns.

With environmental impacts, transportation performance, and capital costs similar to those of the rehabilitation options, the replacement options were shown to have improved engineering performance, lower maintenance costs, reduced construction risk, fewer unknowns, and shorter construction duration. These were the bases on which the report concluded that it was not reasonable to further evaluate the rehabilitation options and therefore recommended that only replacement options be further developed as alternatives in the DEIS. Furthermore, as Replacement Option 1 does not provide for CRT (CRT is part of the transit mode recommendation), that option will not be pursued further.

4.5 Alternatives to be Studied in the DEIS

4.5.1 Description of Alternatives

The DEIS analysis will include a range of reasonable alternatives, as described below. It is important to note that more detailed analysis and public input conducted during the EIS development will be considered and eventually lead to recommendation of a preferred alternative. Based on the results of the *Transit Mode Selection Report* (May 2009) and the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009), the No Build Alternative (Alternative A) and four Build Alternatives (Alternatives B through E) will be carried forward into the DEIS:

- The Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge Report (March 2009) recommended that only single- and dual-level bridge replacements be studied in the DEIS.

- The Transit Mode Selection Report (May 2009) recommended that full-corridor BRT from Suffern to Port Chester and CRT from Suffern to Manhattan (Grand Central Terminal) be studied in the DEIS. As the project is multimodal in nature, with proposed bridge, highway, and transit improvements, the EIS will be conducted using a tiered analysis approach, to allow each project component to advance at its own appropriate pace, as described in Chapter 1. Alternatives B through E represent alternative ways of providing full-corridor BRT and CRT from Suffern to Tarrytown with service to GCT.

Subchapters 4.5.1.2 through 4.5.1.6 schematically depict and briefly describe the features of each of the five alternatives. Common elements of the alternatives are described in Subchapter 4.5.1.1. Where the build alternatives primarily differ is in the particular character of the BRT service and infrastructure requirements envisioned for Rockland and Westchester Counties. Basically, bus service could be provided in shared use HOV/HOT lanes, bus lanes, and in a busway. From the beginning, it was assumed that BRT service in Rockland would be provided in additional BRT lanes in the existing Thruway right – of - way. It was also recognized that even the most robust BRT service would utilize only a small percentage of capacity, so the bus lane concept became a shared use facility with the excess capacity utilized by an HOV/ HOT operation. While a busway in Rockland and Westchester Counties was not originally included in the preliminary DEIS alternatives that were the output of the *Alternatives Analysis Report* (January 2006), for several reasons the Project Sponsors decided that elements of a busway should be carried into the DEIS for a complete assessment of the range of BRT travel ways. This decision resulted from input that was received at the BRT Workshop conducted by the Project Sponsors in September 2007 and comments received from the public in 2008.

As part of the BRT Workshop, held September 2007, a panel of outside experts reviewed the proposed characteristics and configuration of the BRT systems within the corridor. In addition to the expert panel, representatives of the Westchester County and Rockland County planning departments also participated in the two-day workshop. The experts made a series of recommendations to the team including that BRT and HOT/HOV lanes should be separate services within the corridor. Their reasoning included the fact that HOT/HOV lanes are not as effective a location for BRT as dedicated travel ways because the lane is not exclusive to the buses and additional vehicles may impact the performance of the BRT system. They also stated that shared HOT/HOV lanes in the center lanes of the Thruway could impact the ease of access that BRT vehicles would have to the lanes.

With respect to public input, concern was raised throughout the process that there was not equal treatment of potential BRT and CRT systems in the corridor, resulting in a biased evaluation of alternatives and options. The concern expressed was that the Project Sponsors were comparing costly CRT solutions to BRT solutions that were not fully BRT in the sense that buses were not in an exclusive travel way, thus not providing BRT in the true sense. This concern about the nature of BRT echoed those discussed at the BRT Workshop.

As a result of this input, a Westchester busway was added to the *Transit Mode Selection Report* (May 2009) in the form of Option 3B and the Project Sponsors have decided to study a busway in Rockland in the DEIS as a logical continuation of a Westchester busway. Thus, two possible implementations of BRT will be evaluated for each county, as described below and in Table 4-5:

- **BRT in Rockland County in Busway:**
  - Would operate in one EB lane and one WB lane busway from the vicinity of Suffern to the Tappan Zee Bridge.
  - High-speed operation with extensive feeder-bus connectivity.
  - Minimal interference from the general-purpose traffic.
  - On the Tappan Zee Bridge, BRT would operate in bus lanes.
  - The lack of HOV/HOT capacity will also be evaluated, and compared to the shared used Alternative which does provide HOV/HOT capacity.

- **BRT in Rockland County in HOV/HOT Lanes:**
  - Would operate on a section of the Piermont Railroad ROW in Suffern and in HOV/HOT lanes within the I-287 ROW.
  - On the Tappan Zee Bridge, BRT would operate in HOV/HOT lanes.

- **BRT in Westchester County in Busway:**
  - Would operate in a busway along I-287 from the Tappan Zee Bridge to Port Chester.
  - In addition to the I-287 busway, service would also be provided through White Plains in bus lanes.
  - The busway would operate at high speeds and have extensive feeder-bus connectivity.
  - BRT service would have transfer capability to the Hudson, Harlem, and New Haven Lines.

- **BRT in Westchester County in Bus Lanes:**
  - Would operate in bus lanes on NY Route 119, in White Plains, and on Westchester Ave.
  - Some portion of BRT in Westchester between Exits 1 and 5 would be in a busway, as would the connection from I-287 to the Metro-North Port Chester Station.
  - BRT service would have transfer capability to the Hudson, Harlem and New Haven Lines.

Table 4-5

Key Features of the Build Alternatives

Alternative	BRT in Rockland		BRT in Westchester		CRT in Rockland	Replacement Bridge	Roadway
	Busway	HOV/ HOT Lanes	Busway	Bus Lanes			
B Full-Corridor Busway and Rockland CRT	✓		✓		✓	✓	✓
C Busway/Bus Lanes and Rockland CRT	✓			✓	✓	✓	✓
D HOV/HOT/ Busway and Rockland CRT		✓	✓		✓	✓	✓
E HOV/HOT/ Bus Lanes and Rockland CRT		✓		✓	✓	✓	✓

4.5.1.1 Common Elements of the DEIS Alternatives

Four basic elements – the nature of CRT service proposed for Rockland County, highway reconstruction to accommodate transit, TDM/TSM measures, and a replacement bridge to carry transit – are essentially constant over all of the build alternatives, as follows:

- **CRT in Rockland County**: The CRT service would begin in Suffern with a direct connection to the Port Jervis Line and continue across Rockland County to a direct connection with the Hudson Line in Tarrytown (the study limits). Rail service would then continue from Tarrytown providing a one-seat ride to the ultimate GCT destination.

- **Roadway**: A reconstructed highway to accommodate the recommended transit solution would be built. Other features to be studied include interchange reconfiguration and climbing lanes, and for Alternatives D and E, HOV/HOT lanes in Rockland County (incorporating BRT). There are no proposed roadway improvements that are not related to transit east of Exit 9 (Tarrytown) in Westchester County.

- **TDM/TSM Measures** – Potential TDM/TSM measures include ramp metering and congestion pricing.

- **Replacement Bridge**: A single- or dual-level replacement bridge that accommodates BRT and CRT in addition to the highway lanes would be built (Figure 4-12). All bridge configurations will feature two CRT tracks and the same number and width of lanes, busways or BRT/HOV/HOT lanes, shoulders, and bicycle/pedestrian facilities. The single- and dual-level replacement bridge options identified in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* Report (March 2009) will be refined to optimize the location of the highway lanes and transit modes on the structure(s).

The transit location on the bridge (CRT in particular) may vary significantly – from the construction of an additional span (single-level) to the addition of another structure level (dual-level). The evaluations performed in the DEIS will also determine the extent of the construction of the transit portions of the replacement bridge to be performed in the initial bridge construction and those portions, if any, to be deferred to the future Tier 2 Transit Environmental Process. This phasing of the transit implementation reflects the anticipated longer planning and development process characteristic of transit reflected in the tiering of the DEIS and future environmental process.

Possible
Single-Level Bridge

Possible
Dual-Level Bridge

Figure 4-12 DEIS Bridge Options

4.5.1.2 Alternative A – No Build

Consistent with NEPA requirements, a No Build Alternative (Figure 4-13) will be analyzed in the DEIS. There are several key components of the No Build Alternative. The first includes the maintenance of the bridge structure and highway to avoid unacceptable levels of deterioration that would lead to operational and safety deficiencies. Second, the No Build would include the proposed projects listed in the latest TIP, including highway improvements in Westchester County. The TIP includes those projects contained within the fiscally constrained portion of the Long Range Transportation Plan (LRTP) for the region.

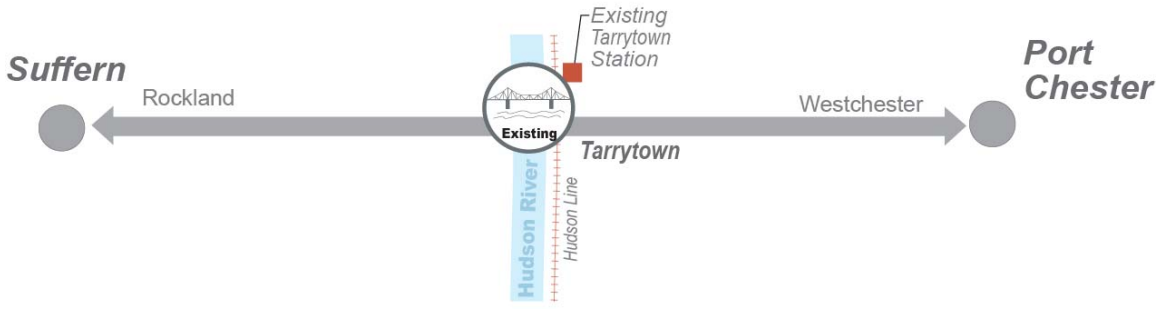

Figure 4-13 Alternative A – No Build

4.5.1.3 Alternative B – Full-Corridor Busway and Rockland CRT

Alternative B (Figure 4-14) would provide BRT service between Suffern and Port Chester by implementing BRT in Rockland and Westchester Counties in a busway, as well as CRT service in Rockland County. The alignment provides a BRT trunk route, primarily along I-287, that is intended to operate like a rail system. The trunk would extend from Suffern to Port Chester, connecting the NJTransit Suffern Station to the Port Chester New Haven Line Station.

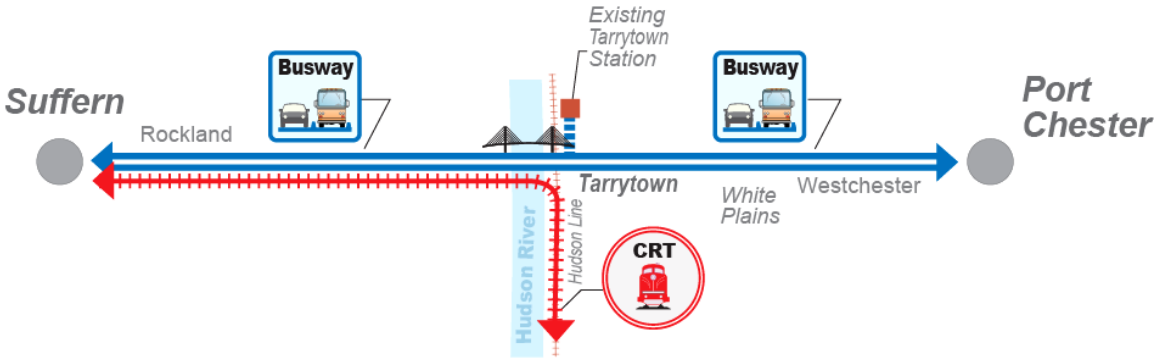

Figure 4-14 Alternative B – Full-Corridor Busway and Rockland CRT

4.5.1.4 Alternative C – Busway/Bus Lanes and Rockland CRT

Alternative C (Figure 4-15) would provide BRT service between Suffern and Port Chester by means of BRT in a Rockland County busway and BRT in Westchester County in bus lanes, as well as provide CRT service in Rockland County.

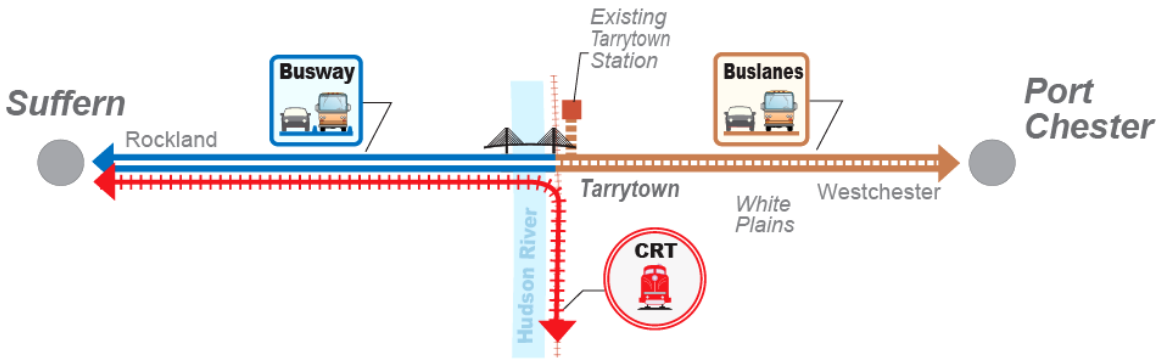

Figure 4-15 Alternative C – Busway/Bus Lanes and Rockland CRT

4.5.1.5 Alternative D – HOV/HOT/Busway and Rockland CRT

Alternative D (Figure 4-16) would provide BRT service between Suffern and Port Chester by means of BRT in Rockland County in HOV/HOT lanes and BRT in Westchester County in a busway, and provide CRT service in Rockland County.

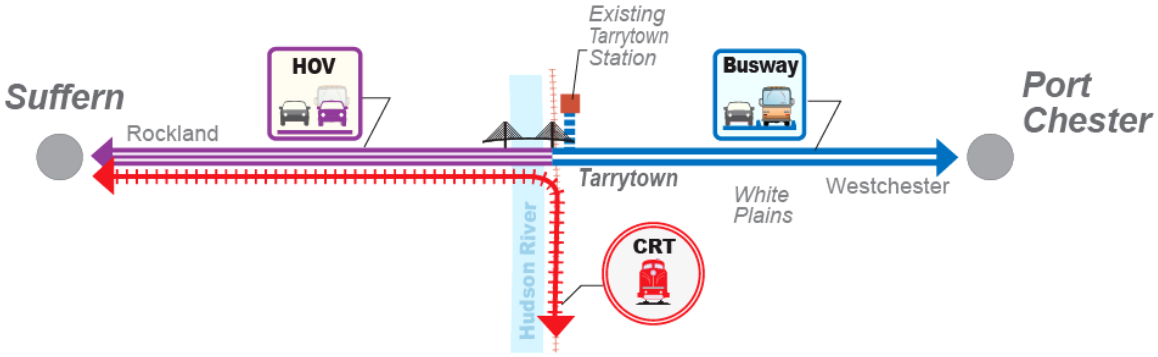

Figure 4-16 Alternative D – HOV/HOT/Busway and Rockland CRT

4.5.1.6 Alternative E – HOV/HOT/Bus Lanes and Rockland CRT

Alternative E (Figure 4-17) would provide BRT service between Suffern and Port Chester by means of BRT in Rockland County in HOV/HOT lanes and BRT in Westchester County in bus lanes, and provide CRT service in Rockland County.

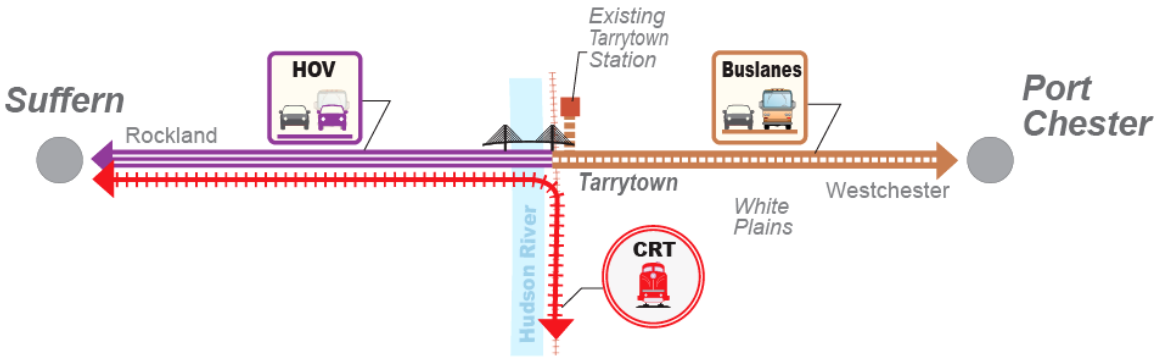

Figure 4-17 Alternative E – HOV/HOT/Bus Lanes and Rockland CRT

4.5.2 Cost

The project cost estimate for the recommended transportation improvements is $16 billion (in 2012 dollars). All costs were based on quantities and rates to establish base construction costs, which were then factored to account for escalation, contingency, contractor general conditions, and soft costs. Rates are appropriate for the downstate New York market.

To determine the total capital cost, the following factors were considered:

- Detailed cost estimates were completed in 2007. At that time, the project anticipated a schedule which completed construction in 2015, with a mid-point of construction in 2012. Estimates were therefore escalated to 2012.
- The cost estimate includes a fairly high level of detail in terms of distinct work elements, quantities of materials, and unit prices. This allows for a higher level of confidence in the base costs, early in the study.
- Base costs were increased by 24.6 percent to account for cost escalation. An annual inflation rate of 4.5 percent was used from 2007 to 2012.
- Escalated base costs were increased by 30 percent to account for contingency.
- Contingency and escalated base costs were increased by 32.25 percent to account for contractor general conditions, including mobilization, overhead, insurance and profit.
- The combined general conditions, contingency and escalated base costs were increased by 30 percent to account for soft costs, which include engineering design, permitting, construction management, program management, and direct agency costs.
- Based on the preliminary design development, the majority of the proposed work is contained within the existing highway boundary. The ROW requirements outside of the existing highway boundary for the transit–ready highway and bridge improvements are relatively minimal, and are assumed to be part of the contingency.

These costs are very preliminary in nature due to the stage of project development and a more refined cost estimate will be produced in the DEIS. Of critical importance is the understanding and acknowledgement that there are several components of the overall project cost, and those components will be implemented over a significant time span, which will determine the ultimate actual cost of the total project. Those components include:

- Tappan Zee Bridge Replacement $ 6.4B
- Highway Improvements $ 1.9B
- Bus Rapid Transit Improvements $ 1.0B
- Commuter Rail Transit Improvements $ 6.7B

Current Benchmark: $16.0B

In the DEIS, the most likely timeframes for implementation of these components will be presented and the estimated costs for each of the components will be refined. The timing, sequencing and implementation will depend on many factors, including the finance plan and the future Tier 2 Transit Environmental Process which will be formulated for the entire project. There is no doubt, the revised costs will vary from the $16 billion current benchmark, and the ranges of those costs will continue to be updated/refined up until construction occurs. In addition, FHWA will be conducting a cost estimate review (CER) of the project costs prior to distributing the FEIS for public comment. When evaluating the project costs, the CER will be a risk based approach.

5 Social, Economic, and Environmental Considerations

The DEIS for the Tappan Zee Bridge/I-287 Corridor Project will assess impacts of project alternatives on the affected environment in the corridor. The document will:

- Summarize the results of coordination with federal, state, and local agencies.
- Present the appropriate federal and state regulations and policies.
- Inventory and compile previous studies.
- Describe the methodology used to assess impacts.
- Identify the affected environment.
- Analyze potential construction-related (short-term) and operational (long-term) impacts (direct, indirect, and cumulative) of the alternatives.
- Identify and analyze opportunities for avoiding, minimizing, and mitigating significant impacts.
- Serve as a decision-making tool, and comply with NEPA documentation requirements.

The DEIS will address subject matters under various federal statutes, including the Endangered Species Act (ESA), National Historic Preservation Act (NHPA), Clean Air Act (CAA), and Clean Water Act (CWA), among others, for which permits will be sought.

The methodology presented in this chapter is a summary of the detailed methodology that will be used in preparation of the DEIS. The DEIS Methodology, which is being refined, will be distributed for comment to the Cooperating Agencies as referenced in the *SAFETEA-LU Section 6002 Coordination Plan* (Appendix B).

The DEIS Methodology also addresses the analysis years for the DEIS, which include 2017, the estimated time of completion (ETC), and 2047, which is the design year of ETC+30 years. Other years may be analyzed to address certain environmental topics like air quality. In addition to these analysis years, the study will also evaluate additional intermediate analysis years to account for and evaluate the sequencing of the transit components in the intervening years between 2017 and 2047.

A Tier 1 transit analysis will be conducted to support a broad evaluation of planning level alternatives during the environmental review under NEPA. A Tier 2 bridge and highway analysis will be conducted using traditional NEPA assessment methodologies. A future Tier 2 Transit Environmental Process will be initiated during the bridge and highway design phase after a decision has been made to advance the BRT and CRT modes in either single or sequenced environmental documentation.

5.1 Transportation

5.1.1 Roadway and Traffic

An analysis of relevant major roadways will be developed to understand the existing conditions/traffic level, and to identify and quantify key problem areas and probable causes. This inventory will generally involve the interchange areas within the corridor and approach roads within one-half mile of the I-287 interchange ramps. Existing traffic conditions will be documented using several methods and data sources. Existing daily, AM peak and PM peak period traffic volume counts on affected roadways will be obtained from a number of sources, including the NYSTA, NYSDOT, Rockland and Westchester Counties, cities along the corridor, and surveys undertaken for the project.

Traffic forecasts will be generated using the NYMTC Best Practice Model (BPM). This data will then be used as input to the Paramics corridor- and facility-specific traffic simulation models to assess the performance and viability of the roadway network, toll plazas, HOV/HOT lanes, and other facilities as appropriate. Baseline and single design year traffic operational analyses of impacted roadways will be undertaken for each of the build alternatives, as well as the No Build Alternative.

5.1.2 Public Transportation

Existing public transit facilities (e.g., bus and rail), services, and ridership information has been compiled. Transit services in the corridor that could be affected by the alternatives have been inventoried and are being kept up to date. These include existing commuter rail services, numerous local and regional bus services, and ferry operations. The impacts of the alternatives on the bus and commuter rail systems will be assessed. Ridership forecasts by mode and line will be developed for the design year for all corridor-wide alternatives, as well as the No Build Alternative. The DEIS will consider ridership diversions and impacts of additional/decreased buses on the regional highway network.

5.1.3 Non-Motorized (Bicycles and Pedestrian)

Existing and planned bicycle and trail facilities have been inventoried together with available information on their current use. The inventory of information will be used as input in developing the impact of alternatives and assessing the potential use of any new bicycle and pedestrian facilities.

5.1.4 Navigation

Previous reports on navigational usage of the Hudson River have been reviewed. Maritime traffic summaries were obtained from the United States Army Corps Engineers and the Hudson River Pilots Association to determine the past and present usage of the channel under the existing bridge. Summaries of vessel accident reports for this segment of the river have already been obtained and reviewed to evaluate existing navigational limitations. The projected future navigation needs of this reach of the river will be considered in the evaluation of the alternatives.

5.1.5 Goods Movement

Existing rail freight lines will be inventoried and information will be gathered on the level of use and function of the lines in the region's overall freight network. Truck freight data will be developed from information contained in the regional transportation model, and augmented by surveys. The implications of the alternatives on goods movement by truck and rail will be assessed based on the likely changes in traffic capacity and travel times in the corridor, as well as a general assessment of the potential for rail freight. While freight is not a specific component of the project alternatives, the potential for freight will be considered in the bridge design so as not to preclude certain freight loadings.

5.1.6 Safety

Existing accident data from I-287 and the other primary roadways in the corridor have been compiled. The impacts of the alternatives on transportation safety will be assessed based on a number of factors, including facility type, roadway geometry, traffic control devices, traffic volumes and vehicle miles of travel. All impacts will be identified based on a comparison to the No Build alternative. Additional safety considerations will be assessed related to the alternative transit alignments.

Safety issues related to the existing bridge were also included in the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009) and will be addressed in the DEIS.

5.2 Socioeconomics and Land Use

5.2.1 Land Use and Zoning

The land use analysis will consider areas approximately one-half mile on either side of the corridor. A review and summary of pertinent land use and socioeconomic policies contained in local, county, and state land use plans and zoning has been conducted.

Alternatives will be compared with respect to potential impacts on land use, zoning and public policy, neighborhood and community cohesion, access to community facilities and services, and effects on local economies and commercial districts resulting from changes in travel patterns, travel time, and congestion. The analyses will also address the consistency of the alternatives with any approved Local Waterfront Revitalization Plans and the State's Coastal Zone Management Policies. New York State's Department of State will be requested to review the consistency analysis provided in the DEIS and to issue a Consistency Determination for the project.

To assist communities along the I-287 corridor with development of a long range outlook that reflects future transit services, NYSDOT is providing funds for training expertise in setting up strategies for TOD. The DEIS will provide a description of the training program and will detail any actions taken or planned by corridor communities as a result of their training experience.

5.2.2 Environmental Justice

Executive Order 12898, issued in February 1994, requires all federal agencies to consider the issues of environmental justice in their decision-making and to develop environmental justice outreach. It focuses attention on the environmental and human health conditions of minority and low-income communities. Key components to an environmental justice strategy are to enhance public participation in the planning and development process, and to ensure that transportation projects do not disproportionately affect minority and low-income populations.

Data on minority populations has been collected from the 2000 Census for the affected communities, identifying both total numbers and percentages of the total population, and comparing these to a larger community context. Similarly, 2000 Census block data on low-income populations (below poverty levels) has been compiled for the affected communities. Alternatives will be assessed to determine if there are any concentrations of these sensitive populations that would suffer disproportionately high and adverse effects from any of the alternatives being considered. Factors such as increased noise levels, loss of economic resources and community access will be considered.

5.2.3 Displacements and Relocation

The number and characteristics of any displaced households, businesses and other institutions will be identified and described. Any potential disproportionate adverse effects on any special social groups (poor, elderly, transit dependent and handicapped) will be identified and evaluated with respect to identification of takings and access changes or limitations for each affected parcel based upon preliminary design plans. Acquisitions of properties, including residences, businesses, parklands, historic/cultural/archaeological resources, prime and unique farmlands (if any), and any other significant uses will be identified.

5.2.4 Public Services and Utilities

Major existing utilities along the corridor will be identified and described, including cable and fiber optic lines, electric transmission lines, substation, and water and gas transmission lines. Alternatives will be evaluated with respect to disruptions, relocations, or need for utility construction.

5.2.5 Historical and Archaeological Resources

Cultural resource assessments and identification efforts pursuant to Section 106 of the NHPA are in progress. Background research and field surveys are being conducted within the study area to determine the location and type of National Register-listed and eligible architectural and archaeological resources.

Alternatives will be evaluated with respect to their potential impacts on National Register-listed and eligible architectural and archaeological resources. Impact analyses will reflect the requirements of Section 106 as well as an assessment of use under Section 4(f) of the US Department of Transportation Act (1966).

5.2.6 Parklands and Section 4(f)/6(f) Evaluation

The nature and location of public parks, public recreation areas and wildlife and waterfowl refuges as defined under Section 4(f) and Section 6(f) properties acquired or developed with Land and Water Conservation Funds along the corridor have been identified and described. An assessment of use on identified Section 4(f) resources and assessment on identified Section 6(f) properties where there is a potential conversion will be evaluated and presented in the DEIS. Section 1010 of the Urban Park and Recreation Recovery Act will also be addressed.

5.3 Natural Environment

5.3.1 Air Quality

Currently, both Rockland and Westchester Counties are in non-attainment for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) and ozone (O_3) as defined by the 1990 CAA Amendments. Westchester County is considered a maintenance (formerly non-attainment) area for carbon monoxide (CO). Motor vehicles are a predominant source of CO emissions and a significant source of particulate matters and ozone generating compounds such as nitrogen oxides (NO_x) and volatile organic compounds (VOC). Therefore, regional and localized analyses will be conducted to determine the degree to which project alternatives impact air quality compared to the No Build alternative. An analysis of mobile source air toxic emissions will be conducted in accordance with FHWA guidelines.

5.3.2 Noise and Vibration

Noise studies will be undertaken to estimate the noise impacts of projected future traffic conditions and rail operations. The applicable standards include those developed by FTA and NYSDOT (Environmental Procedures Manual). The noise analysis will recommend feasible and reasonable abatement measures for significant impacts. Long-term operational noise impacts will be addressed by considering the inclusion of long-term noise barriers into the project's design. Potential vibration conditions will also be assessed, where applicable.

5.3.3 Hudson River Ecosystems and Water Resources

Alternatives may impact various habitats found within and alongside the Hudson River and its estuary, including wetlands and submerged aquatic vegetation that serve as fish feeding and spawning areas. In addition, the river's channel may act as migratory passageway for fish that spawn and feed further upstream, including the striped bass and the short nose sturgeon (an endangered species). A detailed search and analysis of data relating to fish, shellfish, benthic macro invertebrates, plankton, subaqueous vegetation, water chemistry, sediment chemistry, sediment toxicity, avian fauna, wildlife, bathymetry, tidal fluctuations, currents, wave conditions, turbidity, and wetlands is being performed.

Loss of habitats such as shoreline wetlands and in-river submerged aquatic vegetation will be addressed as will the potential impacts of shading by a larger bridge structure. The habitat value of existing bridge foundations will also be considered in the DEIS.

5.3.4 Hudson River Drainage Basin Ecosystems

The corridor contains wetland areas that serve as important terrestrial and aquatic habitats, including potential habitat for protected species. A detailed review of available data has already taken place to identify nature preserves, critical habitats of protected species, vegetative coverage, wetlands, and streams. Alternatives will be compared with respect to their potential effects on habitats occurring along the corridor.

Impacts to water resources along the corridor may occur as a result of roadway contaminants being transported by stormwater and discharged into local streams and tributaries. This impact will be of particular concern where local tributaries discharge to surface water bodies that act as potable water sources. In such circumstances, runoff control features that remove highway contaminants before they enter the tributaries, such as grassy swales, detention basins, and other features that can improve water quality, will be proposed.

5.3.5 Visual Resources and Aesthetics

In the study area, the Hudson River Valley includes several National Historic Landmarks. The valley has also been designated as a National Heritage Area and the Hudson River has been named an American Heritage River. Bridge replacement alternatives will be evaluated in terms of their compatibility with aesthetic and historic values associated with the Hudson River.

Existing view sheds will be evaluated for visual quality and the potential impacts of alternatives will be assessed. Changes that could result from project features (such as the bridge and other major project features like CRT viaducts) will be evaluated qualitatively using three criteria of visual relationship: vividness, intactness, and unity. Viewer groups will be identified and assessed in terms of their sensitivity, based on their numbers and exposure.

For historic structures that have river setting as a defining characteristic, and that will have notable views of the replacement bridge, an indirect adverse effects analysis will be conducted in conformance with regulations pursuant to Section 106 of the NHPA.

5.3.6 Energy

Factors that will be considered in assessing the potential impacts of the alternatives include direct energy components such as change in VMT, type of vehicles using the roadways, fuel consumption of the vehicle fleet and changes in vehicle operating speeds. Also, indirect energy consumption related to maintenance of the overall project will be estimated. Greenhouse gas emissions will be computed based on the estimate of energy consumption for operation of the project.

5.3.7 Geology and Soils

Existing information on topography, soils, and geology has been collected and reviewed. Alternatives will be compared qualitatively with respect to such factors as potential for erosion, changes in topography

from existing conditions (including cut and embankment slopes), and use or disposal of debris or excavated soils.

5.3.8 Hazardous Materials

An assessment of the environmental condition of corridor properties is being conducted taking into consideration the relative significance of each site identified in available federal and state data bases on the basis of suspected contaminants at the site and the relationship of the proposed land use to the hazardous materials. Alternatives will be compared with respect to the level of disturbance they potentially create at the identified contaminated sites along the corridor.

5.4 Construction Impacts

Preliminary construction schedules and conceptual staging plans will be developed and presented in the DEIS. Construction impacts will then be addressed for all environmental disciplines. This will include consideration of such factors as:

- Impacts associated with mainline traffic detours, changes to traffic movements along local arterials, and construction staging areas will be evaluated. Measures to mitigate short-term impacts at construction staging areas and along traffic detour routes will be identified and described in the DEIS.

- Acquisitions and easements required for construction will also be identified in the DEIS.

- Air quality impacts will be assessed and, should significant impacts be predicted, mitigation abatement strategies will be evaluated.

- Noise abatement may involve the selection of traffic detour routes, reduction of construction equipment noise emissions, and installation of temporary noise barriers.

- Construction may temporarily or permanently impact local groundwater resources or surface watercourses. These impacts will be assessed and mitigation strategies identified. Mitigation measures may include sediment erosion and control plans, a storm water management plan, and spill prevention and control strategies.

- Impacts to Hudson River habitats will be analyzed using mathematical models that estimate the dispersion of river sediments disturbed by construction work, the results of which can be compared to applicable water quality standards to assess the significance of the sediment disturbance. Alternatives will also be compared with respect to their potential to impact river habitats as a result of placement of temporary and/or permanent structures in the river and as a result of scouring of bottom sediments during construction.

5.5 Indirect (Secondary) and Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Guidelines established in "Considering Cumulative Effects under the National Environmental Policy Act" (CEQ, January 1997) will be used. The analysis will identify the qualitative direct and indirect effects of the alternatives related to other identified future actions on those elements of the environment where cumulative impacts may be significant. The discussion will include, as appropriate, such topics as regional geography, broad demographic data, major land use patterns and trends, centers of economic activity, the regional transportation network and appropriate natural resources.

Indirect effects, separated from the project's direct effects by geography and time, will be assessed, including the potential for growth-inducing consequences caused by changes in accessibility. The study areas for specific disciplines will vary based on potential impacts. For example, land use and socioeconomics will adopt a proposed 6-mile study corridor centered on I-287 in Rockland and Westchester Counties, and along I-87, I-84, Route 17, and the Port Jervis Line in Orange County. River basin ecosystems will use appropriate drainage basins as study areas. Indirect effects will be analyzed and compared with the No Build Alternative, and appropriate mitigation measures will be identified wherever feasible.

6 Next Steps and Schedule

Figure 6-1 represents the project milestones that reflect the tiering approach and the regulations of SAFETEA-LU Section 6002. Key milestones include:

- **Draft Environmental Impact Statement (August 2010)** - The DEIS will be prepared in a tiered manner and identify the preferred project alternative (Milestone D). The Tier 1 transit analysis will address transit impacts as part of a broad evaluation of planning level alternatives, which includes general alignment, termini points, and general locations of suggested transit station areas. The Tier 2 bridge and highway analysis will analyze impacts based on engineering designs that incorporate the transit mode recommendation. The future Tier 2 Transit Environmental Process will address more detailed transit alignment issues and station locations.

- **DEIS Public Hearing (October 2010) –** After the DEIS is issued for agency and public review, a formal public hearing will be held to solicit comments on the draft document (Milestone M7).

- **Final Environmental Impact Statement (April 2011) –** an FEIS will be prepared based on comments received on the DEIS (Milestone F).

- **Record of Decision (June 2011) –** upon completion of the FEIS, pursuant to NEPA, a ROD will be issued by the FHWA and FTA. Pursuant to SEQRA, a Findings Statement will be issued by the Project Sponsors (Milestone R).

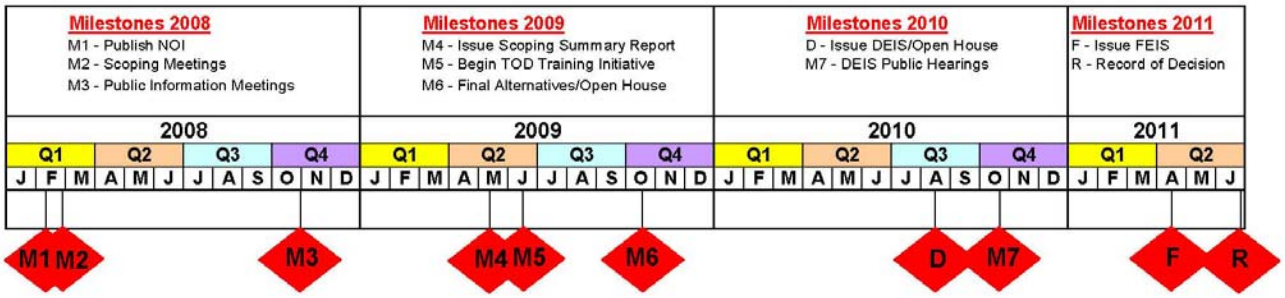

Figure 6-1 Project Schedule

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8 List of Preparers

This document was prepared by the Project Sponsors under the direction of and with the active involvement from the Federal Partners. Key individuals and firms involved in the preparation of the scoping summary report are indicated below.

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Appendix A

Revised Notice of Intent (NOI)

DEPARTMENT OF TRANSPORTATION
Federal Highway Administration
Federal Transit Administration

Environmental Impact Statement: Tappan Zee Bridge/I-287 Corridor in Rockland and Westchester Counties, New York.

AGENCIES: Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), United States Department of Transportation (DOT).

ACTION: Revised Notice of Intent.

SUMMARY: The FHWA and FTA are jointly issuing this Revised Notice of Intent (NOI) to advise the public of modifications to the environmental review process for the Tappan Zee Bridge/I-287 Corridor Environmental Impact Statement (EIS). These revisions include the intent of FHWA and FTA to use a tiered process to facilitate project decision-making, and the intent of FHWA and FTA to utilize the environmental review provisions afforded under Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The EIS will build upon the extensive alternatives analysis, environmental and technical studies and public comments and outreach conducted to date. This NOI revises the NOI that was previously published in the Federal Register on December 23, 2002.

The proposed tiering approach will allow the joint lead agencies to focus on both broad overall corridor issues in a Tier 1 transit analysis of general alignment and mode choice while simultaneously assessing site specific impacts, costs and mitigation measures in a Tier 2 bridge and highway analysis. The scope of analysis in the Tier 1 versus Tier 2 will be at appropriate levels of detail for the decisions at hand and will be determined in collaboration with the public and reviewing agencies. The intent of the joint lead agencies is for the Tier 1 and Tier 2 analyses to be developed concurrently in order to maximize the efficiencies and potential for multimodal solutions.

The Tier 1 transit analysis will provide the basis for a corridor level decision on transit mode(s), alignment(s), and logical termini within the Corridor and sufficient detail of impact assessments and preliminary engineering to allow the Tier 2 highway and bridge elements to proceed to final design and construction. Because the transportation needs of the corridor require a multimodal solution, the highway, bridge, and transit elements are intricately tied to one another and require iterative and concurrent development, analysis and consideration up to the decision on mode and alignment. But once the transit mode and alignment decisions are made, the analysis can focus on the needs of the corridor which includes the structural needs of the existing Tappan Zee Bridge and associated highway network, while preserving the transit corridor within the existing right of way.

Additional purposes of this revised NOI include:

- Advise the public of lead agency roles
- Outline how the provisions of SAFETEA-LU Section 6002 will be met

- Update interested parties regarding the current approach to preparing the EIS
- Provide updated information on the proposed project, purpose and need for the project, and range of alternatives.
- Re-invite participation in the EIS process, including comments on the refined scope of the EIS proposed in this notice.
- Announce the dates, times and locations of upcoming scoping update meetings.

FOR FURTHER INFORMATION CONTACT: Michael P. Anderson, Project Director, NYSDOT, 660 White Plains Road, Suite 340, Tarrytown, NY, 10591, Telephone: (914) 358-0600; or Willet Schraft, Senior Operations Engineer, FHWA, New York Division, Leo W. O'Brien Federal Building, 7th Floor, Clinton Avenue and North Pearl Street, Albany, NY, 12207, Telephone: (518) 431-4125; or Donald Burns, Senior Planner, FTA, One Bowling Green, Room 429, New York, NY, 10004, Telephone: (212) 668-2170.

SUPPLEMENTARY INFORMATION: On December 23, 2002, the FHWA and FTA, in cooperation with the New York State Thruway Authority (NYSTA) and the Metro-North Railroad, a subsidiary of the Metropolitan Transportation Authority (MTA/MNR) issued a Notice of Intent to prepare an Alternatives Analysis (AA) and an Environmental Impact Statement (EIS) for the I-287 Corridor in Westchester and Rockland Counties, NY (Federal Register Volume 67, No. 246). While extensive AA and EIS activity has been conducted since publication of that NOI, the lead agencies have determined that substantial changes have occurred such that a revised approach is warranted. Of considerable note, is that the New York State Department of Transportation (NYSDOT) has become a sponsoring agency and taken on the role of lead project manager. As a sponsoring agency, NYSDOT, as well as NYSTA and MTA/MNR, are considered Joint Lead Agencies for the project under SAFETEA-LU.

1. Scoping

In January 2003, after the December 2002 NOI was published, three scoping meetings were held: one in Westchester County; one in Rockland County; and one in Orange County. Public and agency comments derived from those scoping meetings have been incorporated into the AA and EIS. As a result of the initial scoping process which included a Level 1 and Level 2 alternatives screening process, the alternatives have been reduced from 150 alternative elements to six alternatives. As a result of the changes in the project conditions and approach that have precipitated the issuance of this revised NOI, scoping update meetings will be conducted to obtain current comments on the scope of the EIS. To assist interested parties in formulating their comments, a scoping informational packet will be prepared and will be available upon request from the NYSDOT representative identified above or online at the project's Website (www.tzbsite.com). The scoping packet will include the project's purpose and need, goals and objectives, range of alternatives, environmental issues that will be addressed during the course of the study and the public and agency coordination plan, pursuant to SAFETEA-LU. In addition, the scoping packet will include the evaluation criteria that will be used to conduct the Level 3 alternatives screening process, which will further analyze the remaining alternatives.

In early 2008, three additional public scoping update meetings will be conducted, one each in Westchester, Rockland and Orange Counties, to solicit additional public comments on the scope of the EIS. Each meeting will run from 4:00 to 9:00 p.m. and consist of an informal open house setting and two formal presentations. Formal presentations will be made at 5:00 p.m. and again at 7:00 p.m. After each presentation, the public will be provided the opportunity to comment. Those wishing to speak must sign up by either 5:30 p.m. or 7:30 p.m., respectively. A court reporter will be available to record the formal meeting and public comments. The public meetings will be held in the following locations:

Westchester County Public Scoping Update Meeting: Tuesday, February 26, 2008, The Performing Arts Center, Purchase College, State University of New York, 735 Anderson Hill Road, Purchase, NY 10577.

Orange County Public Scoping Update Meeting: Wednesday, February 27, 2008, Orange-Ulster BOCES Campus, 53 Gibson Road, Goshen, NY 10924

Rockland County Public Scoping Update Meeting: Thursday, February 28, 2008, the Palisades Center, 1000 Palisades Center Drive, West Nyack, NY 10994.

The public comment period will be open for a maximum of 30 days following the February 28 meeting. Comments will be accepted until Monday, March 31, 2008.

Written comments on the scope of the project can be sent to Michael P. Anderson, Project Director, NYSDOT, Tappan Zee Bridge/I-287 Project Office, 660 White Plains Road, Suite 340, Tarrytown, NY 10591 (Telephone: (914) 358-0600). The meetings will be accessible to persons with disabilities. If special needs such as an interpreter or sign language services are needed please contact Michael P. Anderson.

2. Description of the Project Area

The Tappan Zee Bridge/I-287 Corridor (Corridor) is approximately 30 miles in length, extending from the I-87/I-287 Interchange in Suffern, NY to the I-287/I-95 interchange in Port Chester, NY and includes the Tappan Zee Bridge. Maintained by NYSTA, the Corridor encompasses the entire length of the Cross Westchester Expressway (CWE) in Westchester County, connecting two of the most rapidly growing communities in the New York region, Rockland and Orange County with Westchester County, a major employment destination just east of the Hudson River. The Corridor also intersects with the five MTA/MNR commuter rail lines (Port Jervis, Pascack Valley, Hudson, Harlem and New Haven) which run north-south and none of which are oriented east-west through the Corridor or cross the Hudson River. The Corridor is serviced in the east-west direction through the following bus services, the Tappan ZEExpress, Orange Westchester Link (OWL) and other bus services.

3. Purpose and Need

The purpose and need of the project is to address the transportation safety, mobility and capacity needs of the Tappan Zee Bridge/I-287 Corridor. At the conclusion of the scoping process, the EIS will continue to evaluate the multimodal alternatives that meet the purpose and need of the project. Of particular concern is the structural design and integrity of the Tappan Zee Bridge, a vital link in the regional and national transportation network. Numerous goals and objectives for proposed improvements have been developed and refined through public and agency coordination since inception of the original NOI in 2002. Primary goals include providing improved transit service within the Corridor including connections to existing transit service, decreasing congestion and travel times within the Corridor, and addressing the structural integrity and traffic safety of the Tappan Zee Bridge. Further refinement or modification to these goals and objectives and the purpose and needs of the project may be made by the joint lead agencies once the scoping update meetings have been conducted and comments received.

When opened to traffic in 1955, the Tappan Zee Bridge carried approximately 18,000 vehicles. Today, the bridge carries approximately 135,000 vehicles daily with volumes as high as 170,000 on some peak days. During the past 20 years, traffic volumes have grown significantly in the Corridor, by over 50 percent on the CWE and by more than 70 percent on the Tappan Zee Bridge. As a result, the Corridor experiences varying levels of traffic congestion throughout the 30-mile length. The steady increase in traffic demand over the years, together with only limited increases in roadway capacity and limited east-west modal alternatives, have resulted in continual increases in travel time and delay. The problems are most severe during the eastbound morning peak and the westbound evening peak periods, particularly within the vicinity of the Tappan Zee Bridge.

The Tappan Zee Bridge has substandard safety features, narrow lane widths (11 feet 8 inches), no shoulders and a narrow median; operates at or near full capacity in the peak hours; has long periods of stop and go traffic; areas of notable traffic turbulence and an average collision rate four times greater than the average rate (per million vehicle miles), when compared to the whole of the Thruway system. On the highway segment of the corridor, 39 locations on the mainline and various entrance and exit ramps have accident rates in excess of statewide averages.

In addition to its capacity constraints, the structural design and integrity of the bridge requires consideration. While the structural condition is safe to the public, several structural deficiencies also need to be addressed. The bridge is located in a moderate seismically active zone, but has not been designed to withstand the possible seismic events to which the region is susceptible, as reflected in the current seismic code. The seismic vulnerability of the bridge is of vital concern.

Today bus transit, car and van pools operate in mixed traffic and are subject to the same congestion and travel delays. The bridge's current capacity constraints do not allow for dedicated lanes, which would accommodate higher capacity vehicles and increased

transit bus services. One of the most significant findings in the AA analysis to date is that traffic forecasts clearly demonstrate a demand for travel in the corridor that cannot be accommodated by highway improvements alone. The need to include transit improvements in the corridor is strongly indicated.

As a result of these conditions, the EIS will evaluate alternatives that address the following needs of the Corridor:

- Preserve the existing river crossing as a vital link in the regional and national transportation network.
- Provide a river crossing that has structural integrity, meets current design criteria and standards, and accommodates transit.
- Improve highway safety, mobility, and capacity throughout the Corridor.
- Improve transit mobility and capacity throughout the Corridor and travel connections to the existing north-south and east-west transit network.

4. Alternatives

The alternatives under consideration involve different combinations of bridge, highway and transit elements. Transit modes currently undergoing additional evaluation as a result of ongoing analysis include the Bus Rapid Transit (BRT), Light Rail Transit (LRT), and Commuter Rail (CRT). The Alternatives Analysis Report prepared in 2006 identified six alternatives for further study in the EIS. These six alternatives were the result of Level 1 and Level 2 alternatives screening and include the following:

- No Build Alternative
- Bridge Rehabilitation with Transportation Demand Management (TDM) and Transportation Systems Management (TSM) measures
- Full Corridor BRT with a new bridge and highway improvements in Rockland County
- Manhattan-bound Full Corridor CRT with a new bridge and highway improvements in Rockland County
- Manhattan-bound CRT with LRT in Westchester County, a new bridge, and highway improvements in Rockland County
- Manhattan-bound CRT with BRT in Westchester County, a new bridge, and highway improvements in Rockland County

The above six alternatives are currently still under evaluation. However, the EIS will include the results of a Level 3 alternatives screening which may result in the elimination, combination or modification of one or more of the alternatives considered to date. The evaluation criteria used to conduct this further screening will be made available for public and agency comment and finalized as part of the scoping process, consistent with the refined and updated purpose and needs, goals, and objectives. If the Level 3 alternatives screening results in the elimination, combination or modification of one or more of the alternatives, this will be disclosed as part of the revised environmental review process and documented in the EIS, affording the opportunity for public and agency review and

comment during the DEIS public hearings. Alternatives retained for full evaluation in the EIS will be compared to the baseline conditions of the No Build Alternative in terms of their social, economic, and environmental impacts.

5. Probable Effects

The environmental impact assessment of alternatives will be conducted at various levels of detail throughout the environmental review process. In the initial alternatives screening phases of the project conducted to date, the analysis has focused on major differentiating factors amongst the bridge, highway, and transit elements and alignments. This level of analysis will continue in the Level 3 alternatives screening process and documented in a Scoping Update Summary Report to be developed. As alternatives are screened to a reasonable range for detailed study in the DEIS, the analysis will become more detailed and dependent upon additional studies and reports.

Specifically, the DEIS and FEIS will: summarize the results of coordination with federal, state, and local agencies and the public at large; present the appropriate federal, state, and local regulations and policies; inventory and compile previous studies; describe the methodology used to assess impacts; identify the affected environment; predict and analyze the construction-related (short-term) and operational (long-term) impacts (direct, indirect, and cumulative) of reasonable alternatives; and identify opportunities and measures for mitigating significant adverse impacts. Specific scopes for the environmental studies to be used in the Level 3 alternatives screening process and subsequent tiered analysis in the DEIS and FEIS will be established during the public and agency scoping update process.

6. FHWA and FTA Procedures

The EIS is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and implemented by the Council on Environmental Quality (CEQ) regulations (40 CFR parts 1500-1508), the FHWA/FTA Environmental Impact regulations (23 CFR part 771), and the FHWA/FTA Statewide Planning/Metropolitan Planning regulations (23 CFR part 450), as well as the requirements of Section 6002 of SAFETEA-LU. In addition, this EIS will comply with the requirements of the National Historic Preservation Act of 1966, as amended, section 4(f) of the 1966, U.S. Department of Transportation Act, the 1990 Clean Air Act Amendments, Executive Order 12898 on Environmental Justice, Executive Order 11990 Protection of Wetlands, and other applicable statutes, rules and regulations. The EIS and the environmental review process will also satisfy requirements of the New York State Environmental Quality Review Act (SEQRA) (consistent with 6 NYCRR 617.15 and SEQRA regulations, Part 15 Title 17 of NYCRR); this NOI eliminates the need for a positive declaration under that statute.

Regulations implementing NEPA (40 CFR 1500-1508) as well as certain provisions of SAFETEA-LU, call for enhanced agency and public involvement in the EIS process. Several of the pertinent provisions of Section 6002 of SAFETEA-LU that are reflected in the revised approach to the processing of the EIS include: 1) Extend an invitation to other

Federal and non-Federal agencies and Native American tribes that may have an interest in the proposed project to become "Participating Agencies"; 2) Provide an opportunity for involvement in helping to define the purpose for the proposed project, as well as the range of alternatives for consideration in the EIS, and analysis methodologies and level of detail in any such analysis; and 3) Establish a plan for coordinating public and agency participation and comment on the environmental review process. As related to item 3, while the project already has a public and agency coordination plan, it was developed pre-SAFETEA-LU and will be amended to reflect specific requirements set forth in Section 6002 of that legislation. An invitation to all Federal and non-Federal agencies and Native American tribes that may have an interest in the proposed project will be extended. In the event that an agency or tribe is not invited and would like to participate, please contact the Project Manager listed under Contact Information above. A Coordination Plan will be developed summarizing how the public and agencies will be engaged in the process. This plan will be posted to the project website (www.tzbsite.com). The public coordination and outreach efforts will include public meetings, open houses, a project website, Stakeholder Advisory Work Groups, and public hearings.

Compatible with and contributing to the functionality of the overall project, some elements of the Build Alternatives may be functionally independent of other elements. Although the current plan is to evaluate all of these geographically contiguous elements of the alternatives retained for evaluation in the EIS, as the project elements are developed and as schedules and construction phasing plans develop, it is possible that some of the independent elements may be advanced via separate environmental evaluations under NEPA and SEQRA. In addition, New Starts funding may be pursued for a transit component of the proposed project under 49 U.S.C. 5309. If so, any such transit component would become a project itself and would be subject to additional environmental review and New Starts regulations (49 CFR Part 611).

The project sponsors may identify a preferred alternative in the Draft EIS when made available for public and agency comment. Public hearings on the Draft EIS will be held within the study area. On the basis of the Draft EIS and the public and agency comments received, the design of the preferred alternative and other feasible alternatives will be further refined in the Final EIS. The Joint Lead Agencies will identify the preferred alternative in the Final EIS and the Final EIS will serve as the basis for federal environmental findings and determinations needed to conclude the environmental review process related to:

- Tier 1 analysis findings on the transit mode and alignment associated with the preferred alternative.
- Tier 2 analysis findings on the bridge facilities and transit elements from the Tier 1 analysis, approaches and associated highway network improvements within the Corridor associated with the preferred alternative.

(Catalog of Federal Domestic Assistance Program Number 20.205, Highway Planning and Construction. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities apply to this program.)

Jeffrey Kolb, New York Division Administrator, Federal Highway Administration, Leo W. O'Brien Building, 7th Floor, Clinton Avenue and North Pearl Street, Albany, NY, 12207.

Brigid Hynes-Cherin, Region II Administrator, Federal Transit Administration, One Bowling Green, Room 429, New York, NY, 10004.

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DATE ISSUED: _____

_____
Federal Highway Administration, New York Division Administrator

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Federal Transit Administration, Region II Administrator

Appendix B

SAFETEA-LU Section

6002 Coordination Plan

New York State Department of Transportation
New York State Thruway Authority
Metropolitan Transportation Authority/Metro-North Railroad

SAFETEA-LU Section 6002 Coordination Plan

Version 2

Tappan Zee Bridge/I-287 Corridor
Draft Environmental Impact Statement

May 2009

Thruway Authority
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MTA Metro-North Railroad

Contents

1. Introduction

1.1 Purpose of Coordination Plan

In an effort to provide for more efficient environmental reviews for project decision making, Section 6002 of Public Law 104-59 Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), enacted August 10, 2005, implemented the development of a coordination plan for all projects which an Environmental Impact Statement (EIS) is prepared under the National Environmental Policy Act (NEPA) of 1969. The plan's purpose is to coordinate public and agency participation and comment on the environmental review process for the Tappan Zee Bridge /I-287 Corridor Project.

1.2 Project History

The corridor extends for approximately 30 miles through Rockland and Westchester Counties from the I-87/I-287 Interchange in Suffern to the I-287/I-95 Interchange in Port Chester. The corridor includes the 3.1-mile-long Tappan Zee Bridge crossing the Hudson River, and encompasses a critical section of the New York State Thruway and the entire Cross Westchester Expressway (CWE,). The CWE is owned by the New York State Department of Transportation (NYSDOT), but is maintained and patrolled by New York State Thruway Authority (NYSTA) from Exit 1 to Exit 10. It provides a critical link in the federal interstate highway system.

Over the years, the corridor has been the subject of numerous studies and transportation improvements. Improvements that have been made to the Tappan Zee Bridge include the installation of a movable barrier that allows operation of a seven-lane cross section with four lanes in the peak direction, electronic toll collection, and variable pricing for commercial vehicles. Corridor highway improvements include a number of lane additions and other roadway improvements in Rockland County east of Interchange 11 and modifications to the Spring Valley toll barrier. In Westchester County, improvements include the reconstruction/reconfiguration of I-87/I-287 Interchange 8 and other safety and operational roadway improvements on I-287. Transit improvements include adding express bus services on I-87/I-287, feeder bus service across the river to the Tarrytown train station (where passengers bound for Manhattan can transfer to Metro-North's Hudson Line), ferry service between the Ossining train station and Haverstraw, and the opening of park-and-ride lots in Rockland County. Despite the many improvements that have been implemented, congestion in the corridor has grown steadily and the aging bridge structure has reached the point where major reconstruction is needed just to sustain this vital link in the transportation system.

The most recent study of the corridor was the *Long Term Needs Assessment and Alternatives Analysis* (April 2000), which was initiated by the Governors I-287 Task Force. *The Long Term Needs Assessment and Alternatives Analysis* report (April 2000) concluded that while there was no single preferred solution for addressing the transportation needs in the corridor, both a short-term aggressive Transportation Demand Management (TDM) program and longer-term capital improvements are needed. All of the long-term alternatives evaluated by the Task Force called for replacement of the Tappan Zee Bridge because it was concluded that rehabilitation of the existing structure would be highly disruptive, cost an estimated $1.1 billion, and not result in mobility enhancements or meaningful congestion relief. The Task Force further concluded that offering transit as a viable alternative travel option to the single occupant auto would enhance greatly the corridors people-handling capacity.

On November 28, 2000, NYSTA and Metro-North Railroad (Metro-North), an agency of Metropolitan Transportation Authority, announced that an Environmental Impact Statement (EIS) would be undertaken to identify and evaluate alternatives to address the mobility needs of the corridor as well as the structural

and safety needs of the Tappan Zee Bridge. The alternatives contained in the I-287 Task Force report, as well as those suggested by elected officials, transportation and environmental groups, community groups, and the public, are all being considered during the current environmental process.

As part of the *Alternative Analysis Report* (January 2006) and initial environmental process, two cycles of alternative screening, Level 1 and Level 2, were conducted. In Level 1 screening, a "long list" of approximately 150 alternative elements were identified, analyzed, and evaluated according to a limited set of selection criteria. The key criteria used in the screening process included corridor mobility, projected ridership, cost effectiveness, operational aspects, capital and operating/maintenance costs, engineering and constructability considerations, and environmental impacts. These key criteria were developed through a comprehensive program of public outreach, review of previous studies, and recommendations from various agencies and public officials, and were grouped into four broad categories: travel demand management (TDM) and transportation system management (TSM); new/improved transit services; corridor improvements; and Hudson River crossing improvements.

In order to implement the Level 2 screening process, it was necessary to develop the scenarios in sufficient detail to permit the necessary transportation, engineering, environmental, and cost analyses associated with the Level 2 screening process. This involved developing conceptual designs for highway, bridge, and transit elements; developing conceptual, station locations, level of service plans for those scenarios with transit components; and extensive computer modeling to forecast future travel demand.

While the screening activities were in progress, SAFETEA-LU was signed into law on August 10, 2005 refining the environmental review process under NEPA. In addition in December 2005, NYSDOT became an active participant due to the regional importance of the project with their role growing to Project Director in May 2007.

The Project Sponsors has also refined the environmental review process since the original Notice of Intent (NOI) was published in 2002. The Tappan Zee Bridge/I-287 Corridor Project is a multimodal project with proposed bridge, highway and transit improvements. In an effort to expedite the delivery of integrated, multi-modal transportation improvements in way that allows each modal element to advance at its own appropriate pace, the EIS will be conducted with a tiered analysis approach. The EIS will conduct two levels of analysis:

- **Tier 1 Transit Analysis:** Tier 1 transit analysis is the first step of a two-step process to comply with environmental review under NEPA. The Tier 1 transit analysis will provide a broad evaluation of planning level alternatives to determine the general effects on the human and natural environment resulting from the mode choices, alignments, locations and termini of facilities and services under consideration in the EIS. In addition, the general locations of suggested station areas will be identified and evaluated. These conceptual, planning level alternatives will be further evaluated in more detail in a future Tier 2 transit environmental process based on more refined engineering design.

- **Tier 2 Bridge and Highway Analysis:** The Tier 2 bridge and highway analysis will evaluate the potential effects of alternative engineering designs for proposed facilities on the human and natural environment. The analysis of alternatives will focus on the potential site specific impacts of the bridge and highway alternatives along the corridor and identify potential mitigation measures. This analysis will incorporate and be consistent with decisions made as part of the Tier 1 transit analysis.

This process will allow the project to focus the environmental review process and progress work that has been conducted to date.

Due to these significant events the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) requested that the project reissue the NOI formally recognizing the role of NYSDOT and officially complying with SAFETEA-LU Section 6002 guidance for future technical activities.

1.3 Key Resource Concerns

As part of the NEPA process, affected environment, impacts, and mitigations will be evaluated for transportation, environmental, social, and economic elements within the project area. The EIS will contain discussion on the following topics: land use and zoning; displacement and relocation; park lands and public open space; community facilities and services; socioeconomics; environmental justice; transportation; air quality; noise and vibration; energy; historic resources; archaeological resources; visual resources; topography, geology, and soils; water resources; ecology; hazardous materials/waste; utilities; Section 4(f)/6(f) properties; indirect and cumulative impacts; and other NEPA considerations.

The following topics have the potential to affect the project schedule:

- Surface Waters and Navigation
- Historic and Archaeological Resources-
- Wetlands
- Air Quality
- Noise
- Ecology
- Secondary (Indirect) and Cumulative Impacts

1.4 Methodology

The Project team has developed the methodologies that will be utilized for the EIS. As required by SAFETEA-LU Section 6002, Participating and Cooperating Agencies were provided the opportunity to comment on the methodologies. A first draft of the methodology was distributed in March 2008. The document was revised based on comments from the agencies. Additionally, the revised methodology (*Methodology to Assess Social, Economic and Environmental Considerations*) will be distributed for comment to the Cooperating Agencies.

2. Lead/Cooperating/Participating Agencies

2.1 List of Agencies, Roles, and Responsibilities

SAFETEA-LU Section 6002 requires the identification of participating, and cooperating agencies in the development of an EIS. For the Tappan Zee Bridge/I-287 Corridor Project, the Lead Agencies include FHWA and FTA, as the Federal Partners, and NYSDOT, NYSTA, and Metro-North, as the Project Sponsors. The Lead Agencies will determine what other federal, state, and local agencies will serve as participating agencies, and cooperating agencies.

Under SAFETEA-LU, the Lead Agencies must perform the functions that they have traditionally performed in preparing an EIS in accordance with 23 CFR part 771 and 40 CFR parts 1500-1508. In addition, the Lead Agencies now must identify and involve participating agencies; develop coordination plans; provide opportunities for public and participating agency involvement in defining the purpose and need and determining the range of alternatives; and collaborate with participating agencies in determining methodologies and the level of detail for the analysis of EIS alternatives. In addition, Lead Agencies must provide increased oversight in managing the process and resolving issues.

Cooperating Agencies and Participating Agencies
According to Council on Environmental Quality (CEQ) regulations (40 CFR 1508.5), "cooperating agency" means any Federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative. A State or local agency of similar qualifications or, when the effects are on lands of tribal interest, a Native American tribe may, by agreement with the lead agencies, also become a cooperating agency.

Participating agencies are those with an interest in the project. The standard for participating agency status is more encompassing than the standard for cooperating agency status described above. Therefore, cooperating agencies are, by definition, participating agencies, but not all participating agencies are cooperating agencies. The Lead Agencies should consider the distinctions noted below in deciding whether to invite an agency to serve as a cooperating/participating agency or only as a participating agency.

The roles and responsibilities of cooperating and participating agencies are similar, but cooperating agencies have a higher degree of authority, responsibility, and involvement in the environmental review process. A distinguishing feature of a cooperating agency is that the CEQ regulations (40 CFR Section 1501.6) permit a cooperating agency to "assume on request of the lead agency responsibility for developing information and preparing environmental analyses including portions of the environmental impact statement concerning which the cooperating agency has special expertise." An additional distinction is that, pursuant to 40 CFR 1506.3, "a cooperating agency may adopt without re-circulating the environmental impact statement of a lead agency when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied." This provision is particularly important to permitting agencies, such as the U.S. Army Corps of Engineers, who, as cooperating agencies, routinely adopt USDOT environmental documents.

Table 2.1 lists all of the Lead and Cooperating Agencies involved in the environmental review process for the proposed project and their associated roles and responsibilities.

Table 2.1 Lead and Cooperating Agencies

Agency	Role	Responsibilities
Federal Highway Administration (FHWA)	Federal Partner	Manage environmental review process; prepare EIS and decision document; provide opportunity for public & participating/cooperating agency involvement, arbitrate and resolve issues.
Federal Transit Administration (FTA)	Federal Partner	Manage environmental review process; prepare EIS and decision document; provide opportunity for public & participating/cooperating agency involvement, arbitrate and resolve issues.
New York State Department of Transportation (NYSDOT)	Project Sponsor	Manage environmental review process; prepare EIS and decision document; provide opportunity for public & participating/cooperating agency involvement, arbitrate and resolve issues.
Metro North Railroad (Metro-North) a subsidiary of the Metropolitan Transportation Authority (MTA)	Project Sponsor	Manage environmental review process; prepare EIS and decision document; provide opportunity for public & participating/cooperating agency involvement, arbitrate and resolve issues.
New York State Thruway Authority (NYSTA)	Project Sponsor	Manage environmental review process; prepare EIS and decision document; provide opportunity for public & participating/cooperating agency involvement, arbitrate and resolve issues.
New York State Department of Environmental Conservation (NYSDEC)	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Tidal Wetland Permit Freshwater Wetland Permit Protection of Waters Permit Stormwater Discharge Permit SPDES Permit Stationary Air Emission Source Permit
United States Coast Guard (USCG)	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Responsible for shipping channel and shipping traffic in the Hudson River

Table 2.1 Lead and Cooperating Agencies

Agency	Role	Responsibilities
United States Army Corp of Engineers (USACE)	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Potential to adopt the EIS and coordinate public outreach when possible. Section 404 Permit Section 10 Rivers and Harbors Act Permit
US Fish and Wildlife Service (USFWS)	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Participate in the federal review of the Section 404/10 Corps Permit Process.
National Oceanic and Atmospheric Administration (NOAA) , National Marine Fisheries Service (NMFS)	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Incident Take Permit Participate in the federal review of the Section 404/10 Corps Permit Process.

Table 2.1 Lead and Cooperating Agencies

Agency	Role	Responsibilities
US Environmental Protection Agency (EPA)	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Section 309 of the Clean Air Act Responsible for the approval of construction within Sole Source Aquifers. Participate in the federal review of the Section 404/10 Corps Permit Process.
New York State Office of Parks, Recreation and Historic Preservation (SHPO) *(Section 106 Consulting Party)*	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Responsible for Federal Section 106 Review and State Review pursuant to the New York State Historic Preservation Act of 1980.
New York State Office of General Services	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Responsible for Grant of Lands Under Water.
New York City Department of Environmental Protection	Cooperating Agency	Provide comments on: • Purpose and Need • Range of Alternatives • Methodologies • Level of detail for analysis of alternatives • Identification of issues that could substantially delay or prevent granting of permit/approval. • Opportunities for collaboration • Mitigation Coordination with the aqueduct issues.

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Table 2.2 lists all of the agencies that have been involved in the project to date and those that have been invited to become Cooperating Agencies and whether they have accepted, denied or have not responded to the invitation. According to SAFETEA-LU Section 6002, Cooperating Agencies that deny the invitation or are non-responsive can be re-assigned to the role of Participating Agencies.

2.2 Cooperating Agencies			
Agency	**Invite Confirmation**	**Invite Denial**	**No Response**
1. New York State Department of Environmental Conservation (NYSDEC)	x		
2. United States Coast Guard (USCG)	x		
3. United States Army Corp of Engineers (USACE)	x		
4. US Fish and Wildlife Service (USFWS)	x		
5. National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA)			x
6. US Environmental Protection Agency (EPA)	x		
7. New York State Office of Parks, Recreation and Historic Preservation (SHPO) *(Section 106 Consulting Party)*	x		
8. National Park Service		x	
9. New York State Department of State		x	
10. New York State Office of General Services	x		
11. New York City Department of Environmental Protection	x		

Table 2.3 lists the Agencies that have been invited to become Participating Agencies and whether they accepted, declined the invitation and have not responded to the invitation. According to SAFETEA-LU Section 6002, Participating Agencies are defined as any Federal, State or local agency or Native American tribe that has an interest in the project. As Participating Agencies, they will be responsible for the following items:

- Providing comments on the Purpose and Need;
- Providing comments on the Range of Alternatives;
- Providing comments on the Coordination Plan;
- Identifying issues that could substantially delay the project;
- Providing comment on assessment methodologies and level of detail within their agencies' area of expertise; and
- Identifying opportunities for collaboration and mitigation.

2.3 Participating Agencies			
Agency	**Invite Confirmation**	**Invite Denial**	**No Response**
1. New York State Department of State	x		
2. US Department of the Interior, Office of Environmental Policy and Compliance		x	
3. United States Department of Agriculture, Natural Resources Conservation Service			x
4. United States Transportation Command			x
5. Federal Railroad Administration			x
6. Federal Aviation Administration		x	
7. Federal Energy Regulatory Commission		x	
8. United States Department of Defense			x
9. United States Department of Energy		x	
10. United States Department of Health and Human Services			x
11. Centers for Disease Control			x
12. New York State Police – Troop K	x		
13. New York State Police – Troop F		x	
14. New York State Police – Troop T	x		
15. New York State Office of Homeland Security			x
16. Port Authority of New York and New Jersey	x		
17. Westchester County Department of Health	x		
18. Rockland County Department of Health	x		
19. Federal Emergency Management Agency		x	
20. Soil and Water Conservation District, Rockland County			x
21. Soil and Water Conservation District, Westchester County	x		
22. Advisory Council on Historic Preservation *(Section 106 Consulting Party)*	x		
23. Palisades Interstate Park Commission	x		
24. Orange County Transportation Council	x		
25. New York Metropolitan Transportation Council		x	
26. North Jersey Transportation Planning Authority			x
27. New Jersey Transit	x		
28. South Western Regional Planning Agency	x		
29. National Park Service	x		
30. Orange County	x		
31. Rockland County	x		
32. Westchester County	x		
33. City of Port Jervis		x	
34. City of Rye	x		
35. City of White Plains	x		
36. Town of Clarkstown	x		
37. Town of Greenburgh	x		
38. Town of Orangetown	x		
39. Town of Ramapo			x
40. Town of Rye			x
41. Village of Sleepy Hollow			x
42. Village of Airmont	x		
43. Village of Chestnut Ridge			x

2.3 Participating Agencies			
Agency	**Invite Confirmation**	**Invite Denial**	**No Response**
44. Village of Elmsford	x		
45. Village of Grandview-On-Hudson			x
46. Village of Hasting-On-Hudson			x
47. Village of Hillburn			x
48. Village of Irvington	x		
49. Village of Kaser	x		
50. Village of Montebello	x		
51. Village of Port Chester	x		
52. Village of Rye Brook	x		
53. Village of Nyack	x		
54. Village of South Nyack			x
55. Village of Spring Valley	x		
56. Village of Suffern			x
57. Village of Tarrytown	x		
58. Village of Upper Nyack	x		
59. Village of Harrison	x		

These tables represent the responses received to date of the acknowledgements of the agency coordination and participation letters. Agencies had 30 days to accept and identify a contact person or decline in writing. In accordance with SAFETEA-LU Section 6002, Cooperating Agencies are also Participating Agencies, and non responding Participating Agencies will have the opportunity to provide comments with the public. The Participating Agency list will be revised and updated as needed throughout the duration of the project.

Consulting Parties
The following entities have been identified as Section 106 Consulting parties and will be consulted throughout the project: the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), New York State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP). In addition, the following entities will serve as Consulting parties focused specifically on Section 106 issues related to the Tappan Zee Bridge and the corridor: Rockland County Historic Preservation Board, Lyndhurst, Westchester County Department of Planning, Village of Tarrytown Planning Board, Friends of Old Croton Aqueduct, Stockbridge-Munsee Band of Mohican Indians and the Delaware Nation. These agencies have interest in pre-historic/historic architectural and archaeological resources. Additional agencies may be added to the Consulting Parties List as warranted.

Regulatory Agencies
A significant part of the environmental review process for the Tappan Zee Bridge/I-287 Corridor Project will be the process of obtaining necessary environmental permits and approvals from a host of regulatory agencies. Federal regulatory Agencies that the project team will engage include USACE and the USCG. State regulatory agencies include NYSDEC, NYSDOS and NYSOGS. All of these agencies are either Cooperating or Participating Agencies and thus currently engaged in the EIS. These agencies will be engaged throughout the EIS to streamline the permitting process.

2.2 Agency Contact Information

Table 2.4 lists all of the agencies involved in the SAFETEA-LU Section 6002 process for the Tappan Zee Bridge/I-287 Corridor Project, points of contact, and if available phone/email.

Table 2.4
Agency Contact Information

Agency	Contact	Address	Phone/Email
1. US Army Corp of Engineers, Department of the Army ***(Current Cooperating Agency, re-affirm status)***	Ms. MaryAnn Miller	26 Federal Plaza, Room 1937 New York, NY 10278	917-790-8516 Maryann.miller@usace.army.mil
2. NYS Department of Environmental Conservation ***(Current Cooperating Agency, re-affirm status)***	Mr. William Janeway	21 South Putt Corners Road New Paltz, NY 12561	845.256.3059 meduke@gw.dec.State.ny.us
3. US Coast Guard ***(Current Cooperating Agency, re-affirm status)***	Mr. Gary Kassof, Commander First Division OBR	Battery Park Building One South Street New York, NY 10004	212.668.7021 Gary.kassof@uscg.mil
4. US Fish and Wildlife Service ***(Invited as Cooperating Agency)***	Mr. Steve Sinkevich Senior Fish and Wildlife Biologist	3 Old Barto Road Brookhaven, NY 11719	631.776.1401 Steve_sinkevich@fws.gov
5. National Oceanic and Atmospheric Administration, National Marine Fisheries Service ***(Invited as Cooperating Agency)***	Ms. Diane Rusanowsky Reviewing Biologist	212 Rogers Avenue Milford, CT 06460	203.882.6504 Diane.rusanowsky@noaa. gov
6. National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Mary Colligan Assistant Regional Administrator for Protected Resources	Northeast Region 1 Blackburn Drive Gloucester, MA 01930	
7. National Marine Fisheries Service - Protected Resources Division	Julie Crocker Fisheries Biologist	1 Blackburn Dr Gloucester, MA 01930	978-281-9300 x6530 julie.crocker@noaa.gov
8. US Environmental Protection Agency ***(Invited as Cooperating Agency)***	Ms. Lingard Knuston Regional NEPA Coordinator	290 Broadway, 25th Floor New York, NY10007	212.637.3747 Knutson.lingard@epamail.epa.gov
9. New York State Office of Parks, Recreation and Historic Preservation ***(Invited as Cooperating Agency)***	Ms. Ruth L. Pierpont Director Field Service Bureau, NYS OPRHP	PO Box 189 Waterford, NY 12188	518.237.8643 Ruth.pierpont@oprhp.state.ny.us
10. NYS Office of General Services ***(Invited as Cooperating Agency)***	Mr. Charles Sheifer, Real Estate Officer / Assistant Chief Bureau of Land Management Officer	Corning Tower, 26th Floor Empire State Plaza Albany, NY 12242	518.474.2195 Charles.sheifer@Ogs.state.ny.us
11. New York City Department of Environmental Protection ***(Invited as Cooperating Agency)***	Ms. Emily Lloyd, Commissioner	Customer Service Center 59-17 Junction Boulevard, 13tth Floor Flushing, NY 11373	
12. NYS Department of State, Coastal Zone Management	Mr. George Stafford, Director of Coastal Resources	41 State Street Albany, NY 12231	518.474.6000
13. United States Department of Agriculture, Natural Resources Conservation Service	Secretary Charles F. Conner	Office of the Secretary 1400 Independence Ave, SW, Room 200A Washington, D.C. 20250	
14. United States Transportation Command (TRANSCOM)	Rear Admiral Mark Harnitchek, USN	Office of Public Affairs United States Transportation Command Scott Air Force Base, IL 62225-5357	618.229.4828
15. Federal Railroad Administration (Railroad)	Joseph H. Boardman, Administrator	Federal Railroad Administration Office of Railroad Development 1120 Vermont Avenue NW - Mail Stop 20 Washington, D.C. 20590	202.493.6381
16. United States Department of Defense	Asst. Deputy Under Secretary of Defense for Environment, Safety and Occupational Health	3400 Defense Pentagon, Room 3C553 Washington, D.C. 20301-3400	
17. United States Department of Health and Human Services	Secretary Mike Leavitt	200 Independence Avenue, S.W. Washington ,D.C. 20201	202.690.7000
18. Centers for Disease Control (CDC)		Special Program Group (F16) National Center for Environmental Health 1600 Clifton Road Atlanta, GA 30333	

Table 2.4
Agency Contact Information

Agency	Contact	Address	Phone/Email
19. National Park Service	Dennis R. Reidenbach, Northeast Regional Director	U.S. Custom House 200 Chestnut Street, 5th Floor Philadelphia, PA 19106	215.597.7013
20. New York State Police	Mr. William Carey	Troop K 2541 Route 44 Salt Point, NY 12578	845.677.7300
21. New York State Police	Captain Evelyn Mallard	Troop T New York State Police 200 Southern Boulevard Albany, NY 12201-0189	914.524.0223 EMallard @troopers.state.ny.us
22. New York State Office of Homeland Security		1220 Washington Avenue State Office Campus Building 7A, Suite 710 Albany, NY 12242	518.402.2227
23. Port Authority of New York and New Jersey	Mr. Louis Venech	225 Park Avenue South New York, NY 10003	212.435.7000
24. Westchester County Department of Health	Joshua Lipsman, Commissioner of Health	145 Huguenot Street, 8th Floor New Rochelle, NY 10801	914.813.5000
25. Rockland County Department of Health	Joan H. Facelle, Commissioner of Health	Robert L. Yeager Health Center Building D 50 Sanatorium Road Pomona, NY 10970	845.364.2512
26. Soil and Water Conservation District, Rockland County	Mr. Allan Beers District Manager	50 Sanitorium Road Building P Pomona, NY 10970	845.364.2670
27. Soil and Water Conservation District, Westchester County	Mr. Robert Doscher, District Manager	148 Martine Avenue Room 432 White Plains, NY 10601	914.995.4407
28. Advisory Council on Historic Preservation	Ms. Katry Harris FHWA Liaison	1100 Pennsylvania Ave., NW Suite, 809 Old Post Office Building Washington, D.C. 20004	202.606.8503 clegard@achp.gov
29. Palisades Interstate Park Commission	Mr. Michael T. Cullen Sr. Landscape Architect	Administration Building Bear Mountain State Park Bear Mountain, NY 10911	845.786.2701 Michael.cullen@ oprhp.state.ny.us
30. Orange County Transportation Council (OCTC)	Mr. John Czamanske AICP, Deputy Commissioner Orange County Department of Planning	124 Main Street Goshen, NY 10924	845.291.2318 dchurch@co. orange.ny.us
31. North Jersey Transportation Planning Authority	Mr. Joel S. Weiner, Executive Director	One Newark Center, 17th Floor Newark, NJ 07102	973.639.8400
32. New Jersey Transit	Rich Roberts Chief Planner	1 Penn Plaza East, 8th Floor Newark, NJ 07105	973.491.7624 rtroberts@njtransit.com
33. South Western Regional Planning Agency	Mr. Floyd Lapp	Government Center, 3rd Floor 888 Washington Blvd. Stamford, CT 06901	203.316.5190
34. Orange County	Hon. Edward A. Diana, County Executive	One County Government Center 255 Main Street Goshen, NY 10924	845.291.2700
35. Rockland County	Mr. Vincent Altieri	Office of the County Executive 11 New Hempstead Road New City, NY10956	845.638.5122
36. Westchester County	Mr. Gerard Mulligan	Michaelian Office Building 148 Martine Avenue White Plains, NY 10601	914.995.2900
37. City of Rye	Hon. Steven Otis Mayor	City Hall 1051 Boston Post Road, 3rd Floor, Room 31 Rye, NY 10580	Phone: 914.967.7404 Fax: 914-967-4604
38. City of White Plains	Mr. Paul Wood	Department of Planning 255 Main Street – Annex White Plains, NY 10601	914.422.1252
39. Town of Clarkstown	Mr. Jose Simoes Senior Town Planner	Planning Department 10 Maple Avenue New City, NY 10956	845.639.2056

Table 2.4
Agency Contact Information

Agency	Contact	Address	Phone/Email
40. Town of Greenburgh	Hon. Paul Feiner Town Supervisor	177 Hillside Avenue Greenburgh, NY 10607	914.993.1500
41. Town of Orangetown	Hon. Thom Kleiner Town Supervisor	Town Hall 26 Orangeburg Road Orangeburg, NY 10962	845.359.5100
42. Town of Ramapo	Mr. Christopher P. St. Lawrence Town Supervisor	Town Hall 237 Route 59 Suffern, NY 10901	845.357.5100
43. Town of Rye	Hon. Joe Carvin Town Supervisor	Town Hall 10 Pearl Street Port Chester, NY 10573	914.939.3075
44. Village of Sleepy Hollow	Hon. Phillip E. Zegarelli Mayor	28 Beekman Avenue (2nd Floor) Sleepy Hollow, NY 10591	914.366.5100
45. Village of Airmont	Hon. Dennis Kay Mayor	251 Cherry Lane PO Box 578 Tallman, NY 10982	845.357.8111
46. Village of Chestnut Ridge	Hon. Jerome Kobre Mayor	277 Old Nyack Turnpike Chestnut Ridge, NY 10977	Phone and email listed on website not working.
47. Village of Elmsford	Hon. Robert Williams Mayor	Village Hall 15 South Stone Avenue Elmsford, NY 10523	914.592.6555
48. Village of Grandview-On-Hudson	Hon. Lawrence R. Lynn Mayor	118 River Road Grand View-On-Hudson, NY 10960	845.358.2919
49. Village of Hasting-On-Hudson	Mr. Francis A. Frobel Village Manager	Village Hall 7 Maple Avenue Hastings-on-Hudson, NY 10706	914.478.3400 villagemanager@hastingsgov.com
50. Village of Hillburn	Hon. Brian L. Miele Mayor	Village Hall 31 Mountain Avenue Hillburn, NY 10931	Phone: 845.357.2036 Fax: 845-357-4933
51. Village of Irvington	Hon. Lawrence Schopfer Mayor	Village Hall 85 Main Street Irvington, NY 10533	914.591.7070
52. Village of Kaser	Hon. Bernard Rosenfeld Mayor	Village Hall 15 Elyon Road Kaser, NY 10952	Phone: 845.352.2932 Fax: 845-352-6254
53. Village of Montebello	Hon. Jeffrey S. Oppenheim Mayor	Village Hall One Montebello Road Montebello, NY 10901	845.368.2211
54. Village of Port Chester	Hon. Dennis Pilla Mayor	Village Hall 10 Pearl Street Port Chester, NY 10573	Phone: 914-939-5201
55. Village of Rye Brook	Hon. Christopher J. Bradbury	Village Hall 938 King Street Rye Brook, NY 10573	914.939.1121
56. Village of Nyack	Hon. John Shields Mayor	Village Hall 9 North Broadway Nyack, NY 10960	845.358.0229
57. Village of South Nyack	Hon. Patricia Du Bow Mayor	282 South Broadway South Nyack, NY 10960	Phone: 845.358.0287 Fax: 845-358-0630
58. Village of Spring Valley	Hon. George O. Darden Mayor (Margaret Jordan, special assistant to the Mayor)	200 North Main Street Spring Valley, NY 10977	845.573.5867 Margaret Jordan's number: 845-517-1124
59. Village of Suffern	Hon. John B. Keegan Mayor	61 Washington Ave. Suffern, NY 10901	Phone: 845-357-2600 Fax: 845-357-0649
60. Village of Tarrytown	Mr. Michael Blau, Village Administrator	Village Hall 21 Wildey Street Tarrytown, NY 10591	914.631.1885
61. Village of Upper Nyack	Hon. Michael Esmay Mayor	Village Hall 328 N. Broadway Upper Nyack, NY 10960	845.358.0084
62. Village of Harrison	Hon. Joan Walsh Mayor	1 Heineman Place Harrison, NY 10528	914.670.3000

This table will be revised upon receipt of agency acknowledgements of the agency coordination and participation letters.

3. Coordination Points, Responsibilities and Project Schedule

3.1 Coordination Points, Information Requirements and Responsibilities

SAFETEA-LU Section 6002 establishes milestones within the environmental review process for involvement and review opportunities. Table 3.1 summarizes the key coordination points between the Lead Agencies, Cooperating Agencies, Participating Agencies, and the public including which agency is responsible for activities during that coordination point. Estimated dates are included for informational and resource planning purposes. Time frames and review periods are established in accordance with SAFETEA-LU Section 6002 unless covered under existing agreements (i.e. review periods established in the NYSDOT/FHWA/SHPO Section 106 Agreement). Note that this table documents activities related to the release of the revised NOI and SAFETEA-LU Section 6002 compliance. It does not document historic project activities.

Table 3.1 Coordination Points

	Coordination Point	Anticipated Commencement Date	Originating Agency	Receiving Agency	Task	Anticipated Completion Date
1	Notice of Initiation Letter	January 2008	NYSDOT	FHWA/FTA	Letter sent to FHWA/FTA, FHWA/FTA acknowledges receipt in writing	January 2008
2	Notice of Intent to Prepare an EIS	February 2008	NYSDOT	FHWA/FTA	NOI to be drafted by NYSDOT, reviewed and accepted by FHWA/FTA, Published in the Federal Register	February 2008
3	Identification of Participating and Coordinating Agencies	February 2008	NYSDOT	Participating and Cooperating Agencies	Invitation letter sent by NYSDOT, Agencies have 30 days to accept and identify a contact person or decline in writing	March 2008
4	SAFETEA-LU Section 6002 Coordination Plan including schedule	February 2008	NYSDOT	Public, Participating and Cooperating Agencies	Coordination plan issued by NYSDOT, Subject to revisions as needed and based upon initial comments, Initial comment period will be part of the public scoping update period **Will be updated as is warranted throughout the project.*	March/April 2008
5	NEPA Scoping Update Meetings	February 2008	NYSDOT FHWA/FTA	Public	Scoping update meetings will be held; comments will be taken on the scoping package including the purpose and need, coordination plan, and range of alternatives; a scoping summary report will be drafted	February 2008

Table 3.1 Coordination Points

	Coordination Point	Anticipated Commencement Date	Originating Agency	Receiving Agency	Task	Anticipated Completion Date
6	Purpose and Need	February 2008	NYSDOT	Public, Participating and Cooperating Agencies	Comments will be accepted as part of the scoping update process	January 2009
7	Range of Alternatives	To be determined.	NYSDOT	Public, Participating and Cooperating Agencies	Comments will be accepted as part of the scoping update process	October 2009
8	Assessment Methodologies	As needed	NYSDOT,	Varies by issue Permitting Agencies, Participating and Cooperating Agencies	Numerous methodologies were developed in cooperation with the permitting agencies and agencies with federally recognized guidance or jurisdiction. Additional methodologies will be developed on an as needed basis with comment from Cooperating and Participating Agencies. Methodology reviewed as part of the Scoping Update process in February 2008. Methodology to Assess Social, Economic, and Environmental Considerations (detailed methodology) will received additional 30-day review by Cooperating Agencies.	July 2009
9	Identify Preferred Alternative	To be Determined	NYSDOT,	Cooperating Agencies	Cooperating Agencies to comment on preferred alternative	August 2010
10	Preliminary DEIS	To be Determined	NYSDOT, FHWA/FTA	Cooperating Agencies	NYSDOT to issue a working draft for high level review and comment, maybe issued on a chapter by chapter basis	August 2010
11	DEIS Circulation	To be Determined	NYSDOT, FHWA/FTA	Public, Participating and Cooperating Agencies	Public hearing and comment period	October 2010

Table 3.1 Coordination Points

	Coordination Point	Anticipated Commencement Date	Originating Agency	Receiving Agency	Task	Anticipated Completion Date
12	Preliminary FEIS	To be Determined	NYSDOT, FHWA/FTA	Cooperating Agencies	NYSDOT to issue a working draft for high level review and comment	April 2011
13	FEIS Circulation	To be Determined	NYSDOT, FHWA/FTA	Public, Participating and Cooperating Agencies	Public Review	To be Determined
14	Record of Decision	To be Determined	FHWA/FTA	Public, Participating and Cooperating Agencies	Record of Decision issued to the Team.	June 2011
15.	Record of Decision published in Federal Register	To be Determine	FHWA/FTA, NYSDOT, NYSTA, Metro-North	Public, Participating and Cooperating Agencies	Record of Decision published in Federal Register	To be determined
16	Permits	To be Determined	NYSDOT	Permitting Agencies	Review of permits and issue permits	To be Determined

3.2 Project Schedule

A general project schedule is provided below in Figure 1.

Note that detailed coordination information for Participating and Cooperating Agencies is provided in Table 3.1 above. In general, participating agencies will have 30 days from the transmittal of information from NYSDOT or FHWA/FTA in which to respond and provide comments. The project schedule anticipates EIS with issuance of the ROD by FHWA/FTA in the second quarter of 2011.

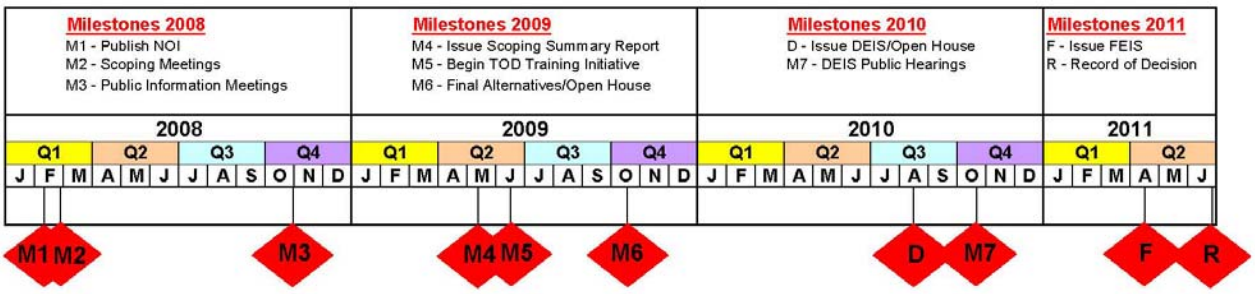

Figure 1 – Project Milestone Schedule

Key Milestones include:

- Publish NOI – February 2008
- Scoping Update Meetings – February 2008
- Public Information Meetings – October 2008

- Issue Scoping Summary Report – May 2009
- Begin TOD Training Initiative – June 2009
- Final Alternatives/Open House – October 2009
- Issue DEIS/Open House – August 2010
- DEIS Public Hearings – October 2010
- Issue FEIS – April 2011
- Record of Decision – June 2011

4. Revision History

Changes to the *SAFETEA-LU Section 6002 Coordination Plan* are identified below in Table 4.1.

Note: If the schedule requires modification, concurrence on the schedule is only required from cooperating agencies if the schedule is being shortened. Participating Agencies are not required to concur with the changes.

Table 4.1 Revision History

Version	Date	Name/Section	Description
Version 1	2/14/2008		
Version 2	5/2009	1.4	Added a methodology section. Revised based on Agencies comments.
		2.1	Added Consulting Parties Added Response to invitations to become Cooperating and Participating Agencies. Added text on Regulatory Agencies.
		Table 2.1	Revised based on Agencies comments.
		Table 2.3	Revised based on Agencies comments.
		Table 2.4	Revised based on Agencies comments.
		2.2	Updated Agency Contact information.
		Table 3.1	Revised based on Agencies comments.
		3.2	Updated Project Schedule.

Appendix C

DEIS Outline

DEIS OUTLINE

Chapter **Title** **Page**

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Chapter	Title	Page

5 – Air Quality
6 – Noise
7 – Energy
8 – Historic Resources
9 – Archaeological Resources
10 – Visual Resources
11 – Geology and Soils
12 – Surface Water Resources
13 – Corridor Ecology
14 – Hudson River Ecology
15 – Hazardous Waste and Contaminated Materials

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Appendix D

Project context: Transportation Plans, Existing Conditions, and Deficiencies

Appendix D: Table of Contents

Chapter Title Page

LIST OF FIGURES

LIST OF TABLES

D Project Context: Transportation Plans, Existing Conditions, and Deficiencies

D.1 Corridor Description

D.1.1 Municipalities in the Project Area

In Rockland County, the study area traverses 12 municipalities, including three towns: Clarkstown, Orangetown, and Ramapo. Within the towns of Ramapo and Orangetown there are nine villages, as shown in Table D-1. In Westchester County, parts of 10 municipalities are within the study area, including two cities (Rye and White Plains), and two towns (Greenburgh and Harrison). Within the towns of Greenburgh and Harrison are six villages, as shown in Table D-2. Relative land area and population are also provided in the tables.

D.1.2 Local Master Plans

In Rockland County, *River to Ridge – A Plan for the 21st Century* was produced by the county in 2001, addressing planning issues and creating a vision for the future. The plan, however, has not been officially adopted and a new effort to create a more current document is underway. In Westchester County, a strategic plan entitled *Patterns for Westchester: The Land and the People* was adopted in 1996; this is presently being updated as *Westchester 2025*, an innovative web-based interactive plan.

Land use planning is complex in the two counties, with each municipality responsible for its own land use policies. Several of the local governments in the corridor are presently updating their plans, including Greenburgh and Harrison. Waterfront Revitalization Plans (WRP), have been adopted by Nyack, Port Chester and the City of Rye; Tarrytown has a Draft WRP. Table D-2 indicates those local governments that have master plans and zoning regulations.

D.1.3 Local Private Development Plans

Private development projects in the corridor occur continuously. The larger proposed or recent projects in various stages of approval that are in the vicinity of the study area include:

- **Village of Tarrytown: "Ferry Landings,"** construction of 238 residential units; an Aquatic Recreation center; 15,000 square feet (sq ft) of retail space; 65,000 sq ft of office space, and the removal of an Asphalt Plant on an approximately 30-acre site located one mile north of the Thruway on the Hudson River waterfront.

- **Village of Tarrytown: "Crescent Associates,"** site plan approval for a 60,000-sq ft, three-story office building with accessory parking to join two existing office buildings. Located opposite the Thruway ramps at 155 White Plains Road.

Table D-1

Local Jurisdictional Governments in the Study Area

Rockland County			Westchester County		
Municipality	Land Area (Sq. Mi.)	Population 2000	Municipality	Land Area (Sq. Mi.)	Population 2000
Town of Clarkstown	38.54	82,082	Town of Greenburgh	30.52	86,764
Town of Orangetown	24.18	47,711	Village of Tarrytown	2.98	11,090
Village of Grand View on Hudson	0.17	284	Village of Elmsford	1.10	4,619
Village of Nyack	0.77	6,737	Village of Irvington	2.79	6,631
Village of South Nyack	0.61	3,473	Town/Village of Harrison*	16.83	24,154
Town of Ramapo	61.24	108,905	Village of Rye Brook	3.47	8,613
Village of Airmont	4.59	7,799	Village of Port Chester	2.36	27,867
Village of Chestnut Ridge	4.94	7,829	City of Rye	5.78	14,955
Village of Hillburn	2.2	881	City of White Plains	9.80	53,077
Village of Montebello	4.36	3,688			
Village of Spring Valley	2.10	25,464			
Village of Suffern	2.09	11,006			

Note: The Town of Harrison and the Village of Harrison are coterminous and operate as a single government.
Population and area data for the towns include the incorporated villages within them.
Source: Population and area data from 2000 Census, (Table GCT-PH1-R), US Department of Commerce.

Table D-2

Local Government Land Use Regulations

Rockland County			Westchester County		
Municipality	Comprehensive Plan/ Date	Zoning	Municipality	Comprehensive Plan/Date	Zoning
Town of Clarkstown	1999	Yes	Town of Greenburgh	2000	Yes
Town of Orangetown	2003	Yes	Village of Tarrytown	-	Yes
Village of Grand View on Hudson	-	Yes	Village of Elmsford	1995	Yes
Village of Nyack	2007	Yes	Village of Irvington	2003	Yes
Village of South Nyack	-	Yes	Town/Village of Harrison	1998	Yes
Town of Ramapo	2004	Yes	Village of Rye Brook	2000	Yes
Village of Airmont	1997	Yes	Village of Port Chester	-	Yes
Village of Chestnut Ridge	-	Yes	City of Rye	1985	Yes
Village of Hillburn	-	Yes	City of White Plains	1997 & 2005	Yes
Village of Montebello	2002	Yes			
Village of Spring Valley	-	Yes			
Village of Suffern	2005	Yes			

- **Village of Sleepy Hollow: "Lighthouse Landing at Sleepy Hollow,"** redevelopment of a former General Motors automotive assembly plant with a mixed-use waterfront project on an approximately 95-acre site. Located approximately one mile north of the Thruway at 199 Beekman Avenue.

- **Town of Greenburgh: "Avalon Green II,"** 27 residential buildings on an approximately 68.5-acre site. The site is a continuation of a development known as "Avalon Green I," located on the adjacent 17 acres. Located approximately one-half mile southwest of the Thruway, near Taxter Road and Town Green Drive.

- **City of White Plains: "North Street Community,"** adaptive reuse of St. Agnes Hospital into a senior residential project, involving construction of 390 housing units, 40 assisted-living units, and 40 long-term care beds on a 23-acre site. Expected completion in 2008. Located approximately one-quarter mile south of the Cross Westchester Expressway (CWE) on North Street, between Westchester Avenue and Bryant Avenue.

- **City of White Plains: "The Pinnacle,"** construction of a 22-story residential building, with 55,177 sq ft of ground- and second-floor retail, adjacent to a six-story residential building and three-level parking garage. Located one-half mile southwest of the CWE, at 250 and 260 Main Street.

- **Town of Harrison: "Sherman Avenue Subdivision,"** 13 single-family residential building lots on an approximately 14.63-acre site. Located on Sherman Avenue in the central-western portion of the Town of Harrison, west of Mamaroneck River (East Branch), east of Lake Street, and north of the CWE.

- **Village of Rye Brook: "Hilton Garden Inn at Rye Brook,"** 145-guest-room hotel facility on 3.03 acres of a 15.44-acre site. Located two and three-quarter miles northeast of the CWE at the intersection of Anderson Hill Road and King Street.

D.1.4 Abutting and Intersecting Highways and Roadways

The project highway corridor begins on the western end at the New York State Thruway (I-87), Interchange 15, which is the intersection of two lanes of I-287 coming from the south with three lanes of the Thruway coming from the north (Figure D-1). These interstates merge to form I-87/I-287 across Rockland County and the Tappan Zee Bridge into Westchester County. When Interchange 15 was completed, in 1992, the corridor became a major through route from New Jersey to Connecticut and New England, in addition to its connection from Upstate New York to Manhattan. Interchange 15 also collects traffic from Route 17 in New Jersey, which is the major truck route for those traveling north from I-80 and NJ Route 4.

At the eastern end of the corridor, I-287/ CWE abuts I-95 (The New England Thruway), at CWE Exit 12. I-95 provides access to the north via the Connecticut Turnpike and to the south to the Cross Bronx Expressway and Manhattan (Figure D-2). At the project corridor, I-95 provides three lanes in each direction.

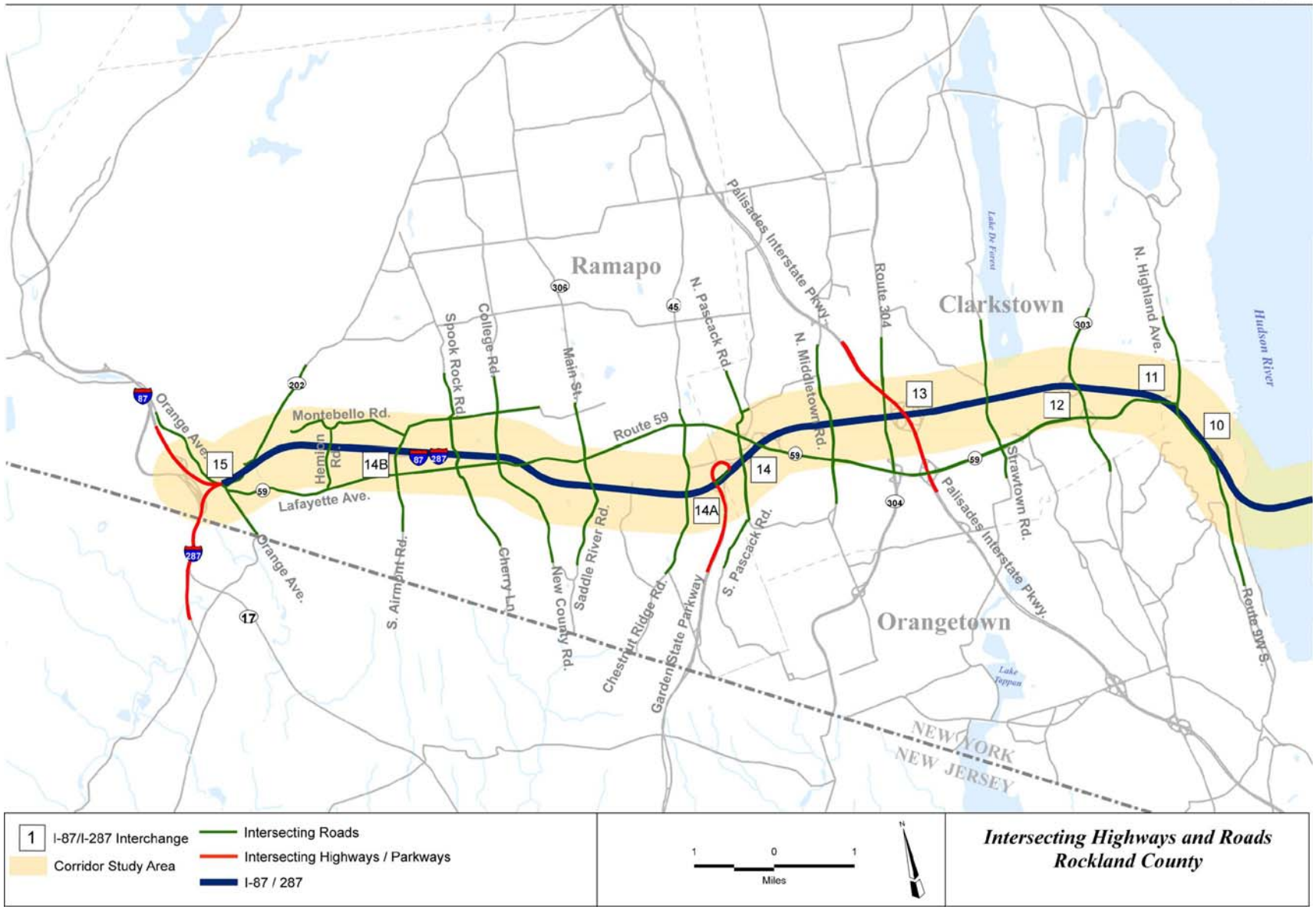


Figure D-1 Intersecting Highways and Roads – Rockland County

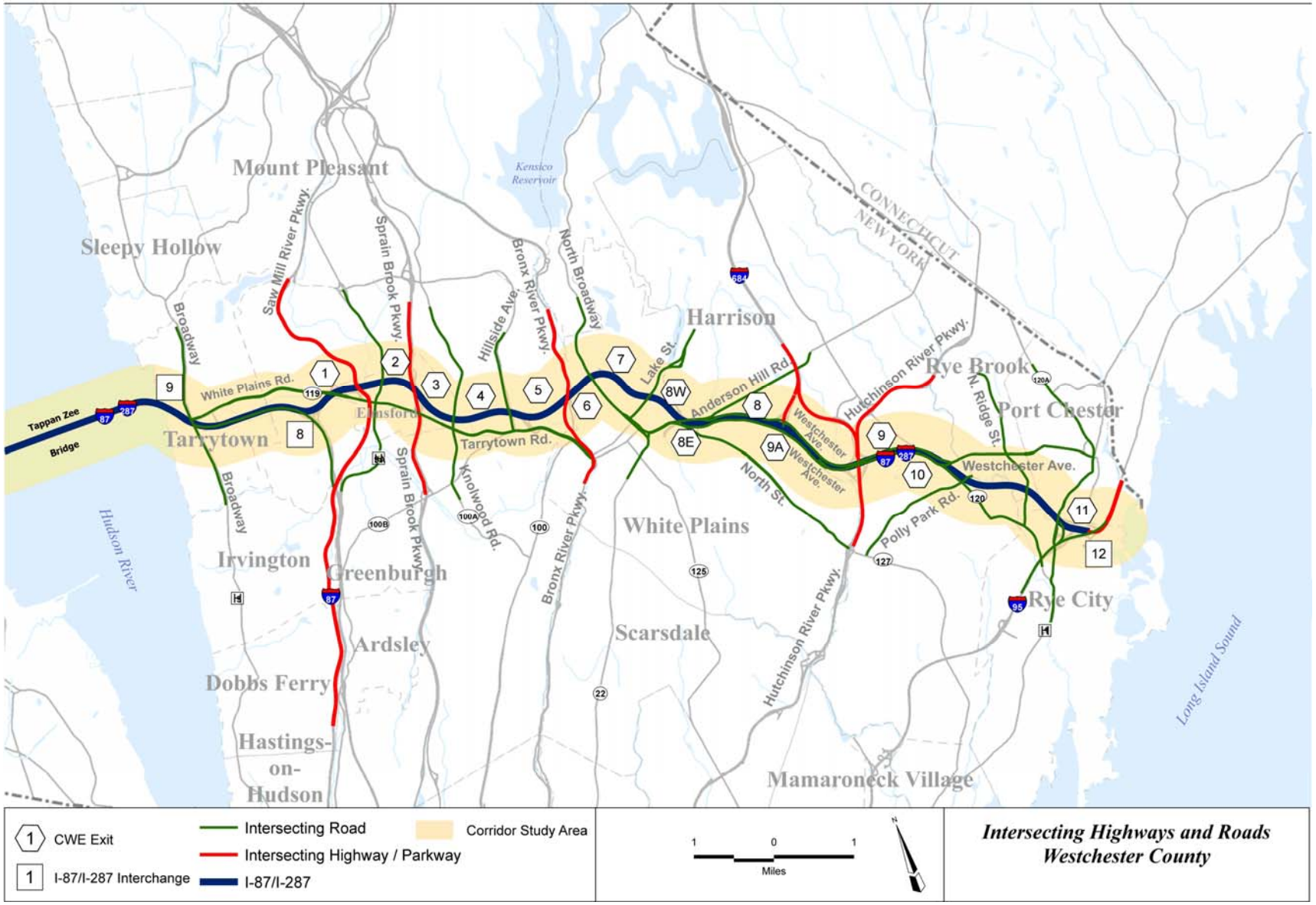


Figure D-2 Intersecting Highways and Roads – Westchester County

Other major highways and parkways that intersect the corridor provide important links to the regional highway network:

- Interchange 14A provides a direct connection to the Garden State Parkway (GSP) which provides a north-south route from Cape May through New Jersey. The GSP is mostly limited to automobiles and buses; however trucks are permitted on the GSP Extension in New York and south of Exit 105 in New Jersey.

- Interchange 13 connects the Palisades Interstate Parkway (PIP) to the corridor, providing direct access to the George Washington Bridge and I-95 in New Jersey, and is limited to automobiles.

- Interchange 8 in Westchester County is the split between I-87 and I-287, with I-87 continuing south to Manhattan as a major truck route. I-287 continues to the east as the CWE. Interchange 8 also connects to the Saw Mill River Parkway, providing direct access to the Henry Hudson Parkway and the west side of Manhattan as well as the Taconic State Parkway and the north for automobiles.

- The Sprain Brook Parkway at CWE Exit 3 provides a connection to New York City via Bronx River Parkway. The Bronx River Parkway can be reached from the CWE at Exit 5 via Tarrytown Road (Route 119).

- CWE Exit 9A is the connection to I-684, providing a truck route to northern Connecticut and the Massachusetts Turnpike (I-90) and Exit 9 connects to the Hutchinson River Parkway, which transitions to the Merritt Parkway and serves Connecticut.

Route 59 is an urban arterial in Rockland County that generally parallels the Thruway between Suffern and Nyack as it passes through several urban centers, never veering more than a mile from the Thruway. It begins north of Suffern as a two-lane arterial. Near Tallman and into Monsey, a third lane is added, in the form of a continuous bi-directional turn lane. The roadway reduces to one lane each way in Spring Valley, and then expands to three lanes each way where it crosses the Thruway at Interchange 14. It continues eastward with three lanes in each direction to the PIP, and narrows to two lanes each way through West Nyack to its terminus in Nyack at Route 9W. Along the way it crosses over or under the Thruway in Suffern, near Tallman, in Nanuet, and in Nyack. The major intersections are signalized and include additional turning lanes throughout.

Route 119 parallels the corridor in Westchester County, (in a similar manner to Route 59 in Rockland County), beginning in Tarrytown, and passes through Greenburgh, White Plains and Harrison. It provides two continuous lanes for most of its length, widening to three lanes in each direction through the office parks near Interchange 8. It transitions back to two lanes each way through Greenburgh, expanding to as many as four lanes each direction as it enters, and runs through, White Plains. It joins the CWE corridor upon exiting the east side of White Plains to become Westchester Avenue where it splits and becomes the service roads for the CWE with two lanes in each direction. The service roads eventually merge into Routes 120 and 120A in Harrison. The section between Tarrytown and eastern White Plains is signalized and includes additional turning lanes at major intersections. The section alongside the CWE includes both signalized intersections and stretches that include grade-separated crossings, and free-flow merges and splits with the CWE and abutting roads.

Additional intersecting roads along the corridor are shown on Figures D-1 and D-2.

D.1.5 Future Plans for Abutting and Intersecting Highways and Roadways

There are a series of highway improvement projects in different stages of planning for the roadways within the corridor. These include resurfacing, pavement rehabilitation, bridge rehabilitation or replacement, localized access and circulation improvements, some individual ramp adjustments, intersection adjustments, addition of non-motorized access amenities, and the installation of advanced transportation monitoring and advisory systems. While valuable, these improvements are not expected to alter the fundamental character of the roadway network outlined above. Specific projects that are planned along the corridor and included in the New York Metropolitan Transportation Council Transportation Improvement Program (TIP) for the 2008-2012 are listed below. A similar list for transit projects is included in Subchapters D.4.1.1 and D.4.2.1.

TIP- Rockland County

- Project B2230: NYSTA - Rehabilitation of NYSTA Bridges over Conrail, NYS Route 17, and Ramapo River.
- Project 803044: NYSDOT - Route 59/Mahwah River. General Bridge Rehabilitation.
- Project 803042: NYSDOT - Route 59 at Airmont Intersection Improvements. Add a stacking lane in each direction as Route 59 approaches Airmont Road.
- Project B0351: NYSTA - Scotland Hill over Thruway: repair deck, seal, and overlay (MP 23.62).
- Project 807416: NYSDOT - Route 45: New Jersey State Line - Route 59 new construction and reconstruction with repaving, adding sidewalks, drainage improvements, but no addition of lanes.
- Project 809355 – NYSDOT - Palisades Interstate Parkway: Stage 2, Route 303 to Western Highway. Construct a paved Class 1 bike path in the corridor of the PIP from the New Jersey line to North Middletown Road.
- Project B0517: NYSTA - Mountain View Avenue - Bridge rehabilitation MP 17.93.
- Project 875522: Rockland County - River Road (CR 1-Stevenson Street to Tappan Zee Bridge) – Town of Orangetown. Reconstruct 1.6 miles of River Road; Reconstruct drainage systems, including underdrain, curb, and sidewalk installation.

TIP-Westchester County

- Project 810322: NYSDOT - Route 9A: Route 119 Executive Boulevard. New construction/reconstruction. Towns of Greenburgh and Mt Pleasant and the Village of Elmsford -- scope to be determined.
- Project 802011: NYSDOT - Route 119; I-287-Route 100 Reconstruction, Stage 3: Reconstruction of pavement, drainage; upgrade of lighting, signals, signs, sidewalks.

- Project 872966: NYSDOT - I-287/CWE Exit 8E/Westchester Avenue: Improve interchange per Westchester Avenue Study Recommendations. Coordination with pin 8729.30 design for implementation with CWE Stage 4. City of White Plains.

- Project 872965: NYSDOT - I-287/CWE Resurfacing: Bloomingdale Road-Route 120. Preventive maintenance single course overlay.

- Project 872966: NYSDOT – I-287/CWE Exit 8E/Westchester Avenue Interchange. Interchange reconstruction.

- Project 872967: NYSDOT - I-287/CWE; Bloomingdale Road to I-95; TSM and ITS Improvements.

- Project 872968: NYSDOT - I-287/CWE Bridges: Bloomingdale Road - Route 120. Bridge replacement: structural.

- Project 8T0498: NYSDOT - I-684/I-287 Bridges. Town of Harrison, Village of Harrison and City of White Plains.

- Project 872964: NYSDOT - CWE Highway resurfacing from Route 120 to I-95.

- Projects 870495: NYSDOT - I-287/CWE Bridges: Route 120 to I-95. General bridge rehabilitation.

- Project B0877: NYSTA - New England Thruway: Replacement of Eastbound CWE ramp over the mainline and Boston Post Road over I-95.

In addition to projects on the TIP, NYMTC prepares a list of Long Range Transportation Projects (LRTP) that are included in their Regional Transportation Plan for the period of 2005- 20030. Those long range highway projects and studies in the Lower Hudson Valley that are specifically related to the project corridor include the following:

LRTP- Rockland County

- Route 59 Signal Optimization: NYSDOT/Rockland County
- Route 59 Bridge and Geometry Improvements: NYSDOT
- County Highway Facility Headquarters in Spring Valley: Rockland County

LRTP - Westchester County

- Route 9A Truck Route Upgrade: NYSDOT
- Cross Westchester Rehabilitation: NYSDOT
- Grove Street Extension Study: City of White Plains
- White Plains Coordinated Signal System: NYSDOT/Westchester County/City of White Plains
- ITS and Signalization Improvements: Saw Mill River Parkway: NYSDOT
- ITS and Signalization Improvements: Hutchinson River Parkway: NYSDOT

D.2 Existing Highway Conditions and Deficiencies

D.2.1 Existing Operations and Traffic Conditions

D.2.1.1 Ownership and Maintenance Jurisdiction

The NYSTA owns and has full jurisdiction over the Thruway in Rockland and in Westchester Counties, including operation, maintenance, and capital investment responsibilities. The NYSTA is also responsible for the operation and maintenance of the CWE and its bridges, and ramps to and from the Sprain Brook Parkway and I-684. These arrangements were made through an agreement dated March 1, 1991, through which the NYSTA acquired the CWE from NYSDOT. The agreement covers the CWE from Thruway Interchange 8 to its eastern connection to I-95. Although NYSTA is responsible for operations and maintenance, NYSDOT continues to be responsible for major capital investments to the CWE.

NYSDOT is also responsible for many of the access-controlled roads crossing the Thruway and the CWE, including the Saw Mill River Parkway, the Sprain Brook Parkway, I-684, and the Hutchinson River Parkway. In Rockland County, NYSDOT shares responsibility for the PIP with the Palisades Interstate Park Commission (PIPC).

D.2.1.2 Control of Access

By definition controlled access highways are those where persons have no right of access either as pedestrians or as operators of vehicles except at junctions with other public roads where defined legal access points are permitted. The interstate highways within the corridor are fully access-controlled access roadways meaning there are no at-grade crossings or intersections and are therefore, physically separated from abutting roads. Vehicles can only enter and exit theses interstate highway at interchanges, along suitable acceleration and deceleration lanes and ramps, so as to safeguard both the public and the mainline's uninterrupted, high-speed characteristics. The parkways that connect to the corridor are also fully access-controlled. However, the Saw Mill River and Bronx River Parkways both feature some at-grade signalized intersections that require stoppages to accommodate entering and exiting turning movements, as well as crossing movements.

D.2.1.3 Traffic Control Devices

Traffic through the corridor is essentially free-flow. Traffic control is exercised through regulatory signage and pavement markings, supplemented by advisory and guidance signage, and policing. Signalization is limited to the Tappan Zee Bridge and the Spring Valley Toll Plazas; at both approaches to the Tappan Zee Bridge to control left-lane closures corresponding to the placement of the moveable barrier; and to control interchange ramp terminal intersections with local streets. Some more lightly-traveled ramp terminals are controlled by stop signals and/or stop signs.

D.2.1.4 Intelligent Transportation Systems

Intelligent transportation system (ITS) features are present across the corridor. The Thruway and Tappan Zee Bridge have 21 closed-circuit TV cameras, 12 overhead variable-message signs, 18 Transcom System for Managing Incidents (TRANSMIT) sites, 16 Highway Advisory Radio (HAR) flashing signs, 5 HAR transmitters, and 30 loop detectors. The highest concentration of features is at the approaches to the Tappan Zee Bridge. Near-term plans are to add two closed-circuit cameras, two TRANSMIT sites, and three variable-message signs. The CWE includes 13 acoustic detectors.

Centralized hardware is housed in Tarrytown. However, traffic operations are actively monitored and managed from the NYSTA centralized Thruway Statewide Operations Center in Albany.

The NYSTA is a member of Transcom, a coalition of 16 transportation and public safety agencies in the New York - New Jersey - Connecticut metropolitan region that provides a cooperative, coordinated approach to transportation management in the region.

D.2.1.5 Speeds and Delay

Speed data were collected along the Thruway in Rockland County in June 2004 for the AM peak period eastbound (Figure D-3), the PM peak period westbound (Figure D-4) and for a typical Sunday evening both eastbound and westbound (Figure D-5). In the absence of incidents that delay traffic, speeds are generally free flowing within Rockland County during the eastbound AM peak. Speeds typically are reduced at Interchange 13 due to the heavy weaving and at the approach to Interchange 11 due to the 3 percent grade from Interchange 12 to Interchange 11.

Congestion appears in the westbound peak period between Interchange 10 and Interchange 11 primarily due to the combination of the 3 percent grade and the lane drop at Interchange 11. Traffic speeds increase and become free flowing beyond Interchange 13 where the grade flattens out and the volume reduces from vehicles exiting to the PIP.

Weekend traffic also has significant congestion problems. There is typically heavy volume on the Thruway in the evening coming south from Harriman, (Interchange 16), returning to Westchester County and New York City, that results in slowdowns crossing the Tappan Zee Bridge. There is increased congestion on the bridge due to the fewer vehicles using *E-Z Pass* on weekends compared to the typical weekday AM peak period. In addition, some of the delays are the result of the commercial activity in the corridor in Rockland County because Bergen County, New Jersey retail outlets are closed on Sundays.

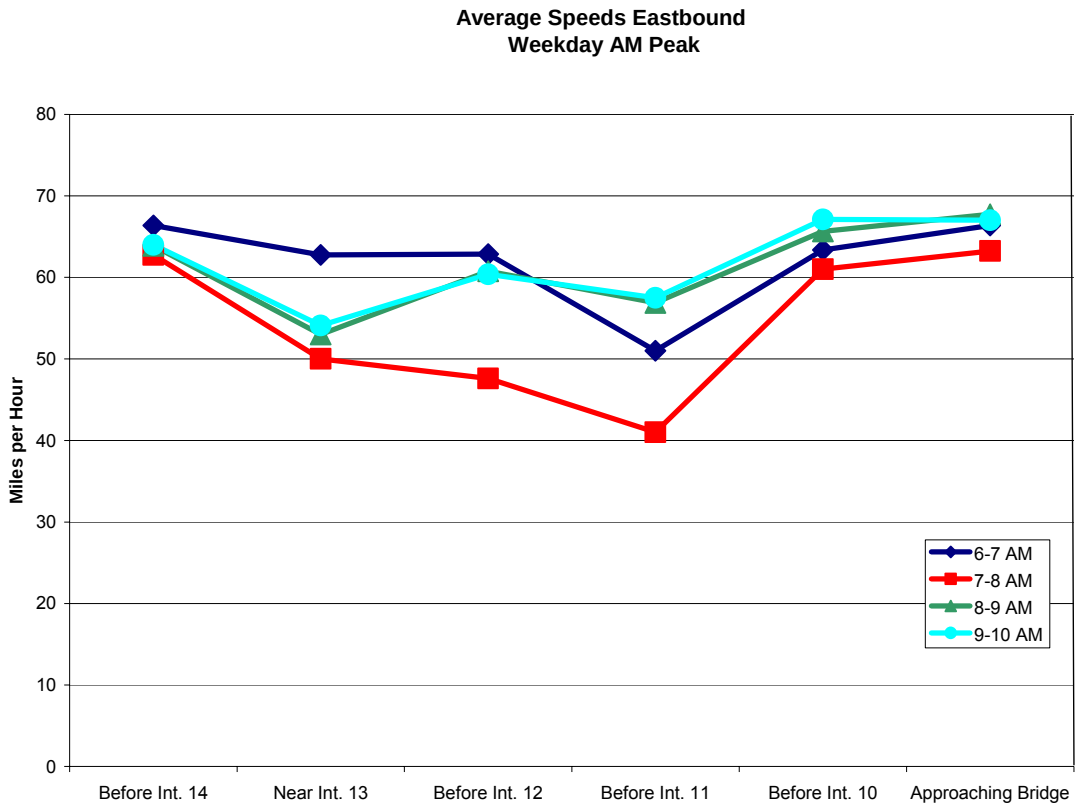


Figure D-3 Average Existing Thruway Speeds – Eastbound Weekday AM Peak (2004)

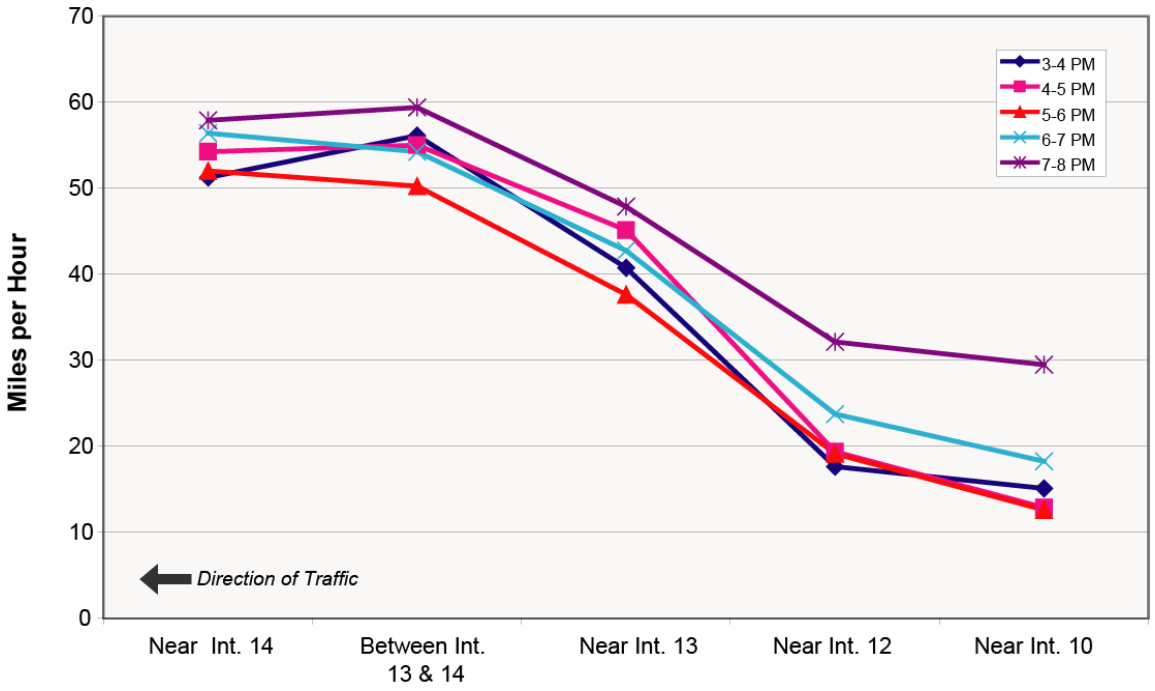


Figure D-4 Average Existing Thruway Speeds – Westbound Weekday PM Peak (2004)

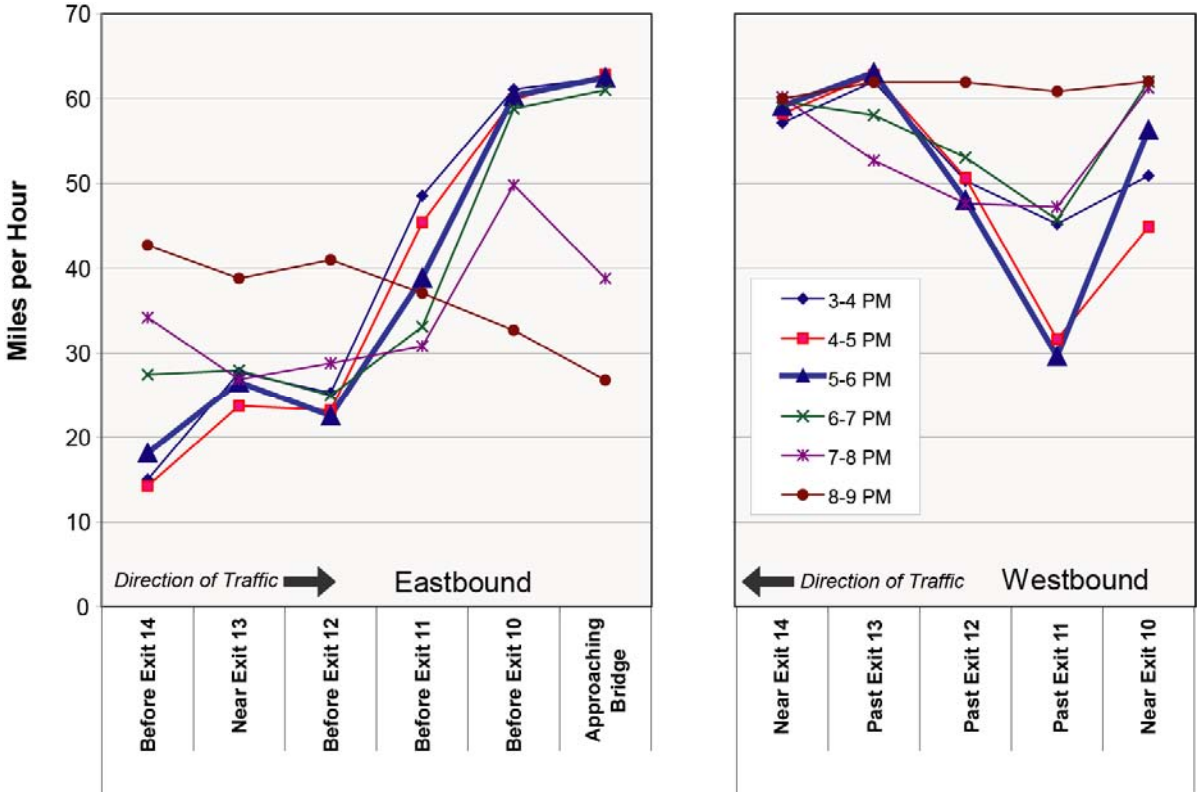


Figure D-5 Average Thruway Speeds – Sunday Evenings (June 2004)

D.2.1.6 Traffic Data Collection

At the start of the project traffic data was collected from various agencies within the corridor. The data collected included automated traffic recorder (ATR) counts indicating average daily traffic (ADT), morning and evening peak-hour volume counts, manual turning-movement (MTM) counts and signal phasing/timing plans. Table D-3 presents a summary of the data and years collected from the various jurisdictional agencies. This data was used for the traffic analysis presented in the following subchapter.

Table D-3

Summary of Roadway and Traffic Data Collected

Agency	Automated Traffic Recorder Counts Collected/Year	Manual Turning Movement Counts Collected/Year	Signal Phasing/ Timing Collected	Roadway Construction Plans
NYSTA	1993 – 1999	NA	NA	Collected
NYSDOT	1996 – 1999	Collected	Collected	Collected
Westchester County	1999 – 2001	2001	Collected	NA
Rockland County	1996 – 1998	NA	NA	NA
White Plains	NA	1985-2001	Collected	NA
Clarkstown	NA	NA	Collected	NA
Nyack	NA	NA	Collected	NA

D.2.1.7 Traffic Volumes and Level of Service

The Tappan Zee Bridge opened to traffic in 1955 and carried an average of 18,000 vehicles daily during its first year of operation. Today, approximately 139,000 vehicles cross the bridge on an average weekday, with volumes as high as 170,000 vehicles on some peak days. During the past 20 years, growth in population and jobs and changing commute patterns have caused traffic volumes to grow significantly in the corridor: more than 50 percent in the corridor and more than 70 percent on the Tappan Zee Bridge.

According to projections from NYMTC, future economic growth is expected for Rockland and Orange Counties. As the population and commercial activity in the region increase, the reliance and demand on the corridor will increase. Congestion on I-87/I-287 is spilling onto parallel arterials, in particular, NY Route 59 in Rockland County and NY Route 119 in Westchester County, especially during peak periods, contributing to the existing capacity constraints.

In addition to commuter traffic, weekend traffic is also expected to increase. Traffic volumes are projected to grow by 30 percent by 2025 for holidays and summer weekends in Rockland County. The large number of non-work, recreational travelers during the Friday PM peak period that exists today would continue to create more westbound congestion than the typical weekday. Similarly, the duration of Sunday afternoon and evening eastbound congestion is worse than the weekday AM peak period.

Level of service (LOS) on a roadway is often used as a measure of mobility. The Highway Capacity Manual (Transportation Research Board Special Report 209, 2000 Edition), defines LOS on a scale of A through F. LOS A describes free-flow operations while LOS F describes traffic with frequent breakdowns

in vehicular flow, commonly characterized as “stop and go” traffic. LOS A through D are characterized as acceptable conditions, while LOS E and F are considered unacceptable or failing conditions.

For the traffic analysis the Best Practices Model (BPM) was used to project future traffic demand. For the 2025 No Build condition the demand was estimated based on 1996 counts, the year to which the BPM was calibrated. The analysis indicates the corridor has various levels of congestion, from acceptable to failing, depending on the location. In Rockland County during the AM peak hour (7AM – 8AM) eastbound operations based on 1996 volumes show acceptable conditions with a LOS C throughout much of the county, with the exception between Interchange 10 and across the Tappan Zee Bridge, that operates at an unacceptable LOS E. In Westchester County, more significant congestion is present, with unacceptable LOS ratings of D and E for the majority of the corridor and LOS F in the area near White Plains between Exit 7 and Exit 8 (Table D-4 and Figure D-6).

During the PM peak hour (5 PM – 6 PM) westbound operations show unacceptable levels of service (LOS E and F) throughout most of the corridor, with the exception between Interchange 10 and Interchange 11 in Nyack, the Tappan Zee Bridge and Interchange 8 (CWE), and Exit 9 and Exit 10 in Westchester County, which all operate at a LOS C or D (Table D-5 and Figure D-7).

Peak period traffic in the corridor is projected to increase at an overall rate of 30 percent between 1996 (the baseline year for this analysis) and 2025. In the AM peak period on a typical weekday in 2025, traffic operations would degrade throughout Rockland County to LOS D/F. The Tappan Zee Bridge would become a capacity constraint primarily due to the existing geometric configuration of the bridge and the projected high traffic volumes. Traffic on the Tappan Zee Bridge would be at LOS F for its full length due not only to high volumes but also due to the combination of its non-standard lane widths and lack of shoulders, and the speed-reducing three percent upgrade approaching the main span. With the bridge acting as a capacity constraint, vehicle queues could extend back as far as Interchange 14 (Route 59) in Rockland County, a distance of about 7 miles. The number of lane miles in the corridor operating at LOS E or F would significantly increase (Table D-4 and Figure D-6). These queues will lengthen the peak period and intensify congestion in the shoulder hours.

In Westchester County, LOS ratings of D/E are projected from the Tappan Zee Bridge to Exit 10 on the CWE – a distance of approximately 10 miles (Table D-4 and Figure D-6), during the AM peak hour in the eastbound direction

In the PM peak hour on a typical day in 2025, westbound traffic operations are projected to degrade throughout Rockland and Westchester Counties. The entire I-87/I-287 mainline between Suffern and the Tappan Zee Bridge in Rockland County would operate at an unacceptable LOS E or F, with the exception of a small segment between Interchange 13 and Interchange 14 and another between Interchange 10 and Interchange 11 in Nyack. Traffic approaching and crossing the Tappan Zee Bridge would operate at an LOS F and continue to operate at unacceptable conditions on the CWE through most of Westchester County (Table D-5 and Figure D-7).

The analysis of traffic flows and projections indicates that if no improvements are made in the corridor, peak-period spreading – increase in the length of the rush hour – would occur as drivers alter the times of their trips, starting out earlier or later to avoid congestion. With peak-spreading in both the AM and PM periods, there would be a reduced time period between the peaks for non-congested operations. Extremely poor operating conditions would extend throughout the entire peak periods with potential traffic impacts to the local roadway network that has access to and from the corridor.

Table D–4

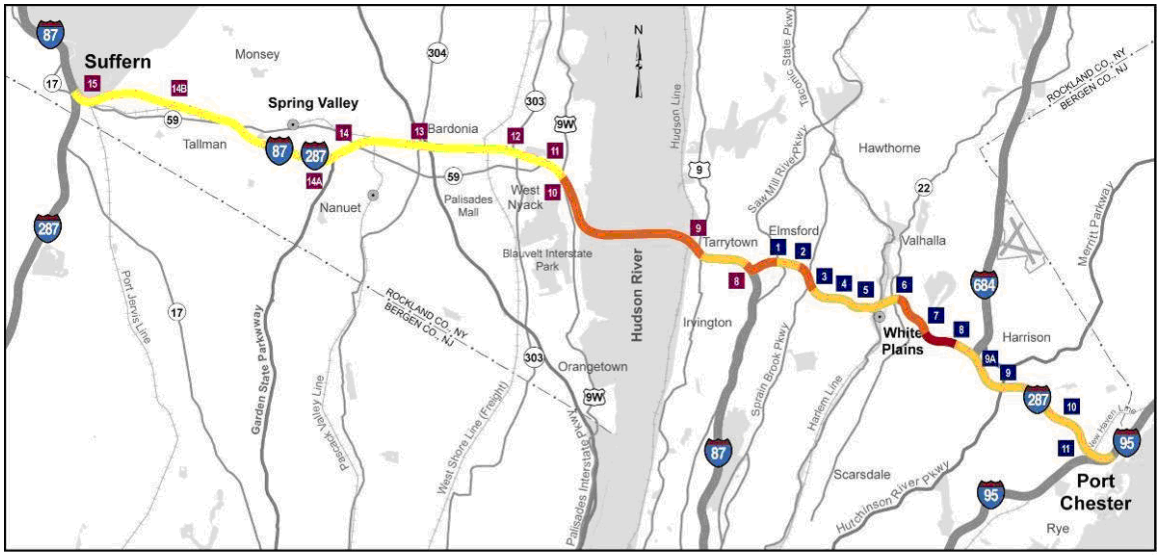
Eastbound AM Peak-Hour
Existing and 2025 No Build Vehicle Volumes/LOS

Expressway Segment	Number of Lanes	Existing Conditions (1)		2025 No Build		Annual % Growth
		Volume	LOS	Volume	LOS	
Rockland County						
Interchange 15 (Route 17) – Interchange 14A (GSP)	3	3900	C	4800	D	0.7%
Interchange 14A (GSP) – Interchange 14 (Route 59)	3	3900	C	5000	D	0.9%
Interchange 14 (Route 59) – Interchange 13 (PIP)	3	3600	C	4400	F[2]	0.7%
Interchange 13 (PIP) – Interchange 12 (Route. 303)	3	3900	C	5000	F[2]	0.9%
Interchange 12 (Route 303) – Interchange 11 (Route 9W, Nyack)	3	4200	C	5400	F[2]	0.9%
Interchange 11 (Route 9W, Nyack) – Interchange 10 (Route 9W, Nyack)	4	5500	C	7200	F[2]	0.9%
Interchange 10 (Route 9W, Nyack) – Interchange 9 (Tappan Zee Bridge)	4	6700	E	8800	F	0.9%
Westchester County						
Interchange 9 (Tappan Zee Bridge) – Interchange 8 (CWE)	4	6300	D	7800	E	0.7%
Exit 2 (Route 9A) – Exit 3 (Sprain Brook)	3	5000	E	5200	E	0.1%
Exit 4 (Route 100A) – Exit 5 (Route 100)	4	6600	D	6800	D	0.1%
Exit 7 (CWP) – Exit 8W (Route 127)	3	6400	F	6800	F	0.2%
Exit 9 (HRP) – Exit 10 (Route 120)	3	4100	D	4500	D	0.3%

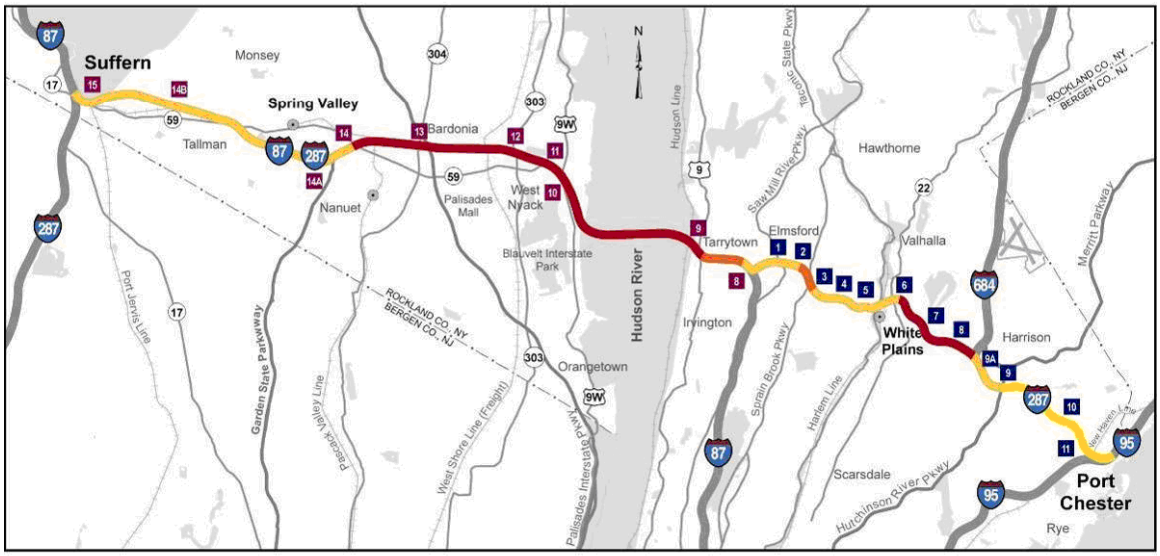
Notes: 1. Existing conditions based on year 1996 traffic counts, the year to which the BPM was calibrated.

2. LOS F is caused by queues from the bridge, not volume on segment itself.

Legend: Route = Route.
GSP = Garden State Parkway
PIP = Palisades Interstate Parkway
CWE = Cross Westchester Expressway
CWP = Central Westchester Parkway
HRP = Hutchinson River Parkway



Existing Mainline LOS
AM Peak Hour Eastbound



No Build 2025 Mainline LOS
AM Peak Hour Eastbound

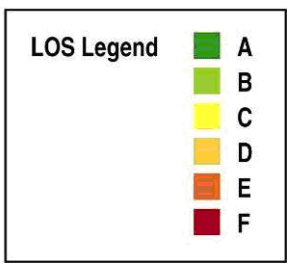


Figure D-6

Existing and No Build 2025
Mainline LOS Eastbound AM Peak Hour

Table D–5

Westbound PM Peak-Hour
Existing and 2025 No Build Vehicle Volumes/LOS

Expressway Segment	Number of Lanes	Existing Conditions (1)		2025 No Build		Annual % Growth
		Volume	LOS	Volume	LOS	
Rockland County						
Interchange 14A (GSP) – Interchange 15 (Route 17)	3	6000	E	7200	F	0.6%
Interchange 14 (Route 59) – Interchange 14A (GSP)	3	5600	E	6700	F	0.6%
Interchange 13 (PIP) – Interchange 14 (Route 59)	3	5800	E	6300	E	0.3%
Interchange 12 (Route. 303) – Interchange 13 (PIP)	3	6200	F	7300	F	0.6%
Interchange 11 (Route 9W, Nyack) – Interchange 12 (Route. 303)	3	5600	E	7100	F	0.8%
Interchange 10 (Route 9W, Nyack) – Interchange 11 (Route 9W, Nyack)	4	5300	C	7100	D	1.0%
Interchange 9 (Tappan Zee Bridge) – Interchange 10 (Route 9W, Nyack)	4	6100	D	8100	F	1.0%
Westchester County						
Interchange 8 (CWE) - Interchange 9 (Tappan Zee Bridge)	4	4900	C	6300	F[2]	0.9%
Exit 3 (Sprain Brook) – Exit 2 (Route 9A)	3	5100	E	5800	F	0.4%
Exit 5 (Route 100) – Exit 4 (Route 100A)	3	6000	E	6300	F	0.2%
Exit 8W (Route 127) – Exit 7 (CWP)	3	5100	E	6000	F	0.8%
Exit 10 (Route 120) – Exit 9 (HRP)	3	3700	C	4200	D	0.4%

Notes: 1.Existing conditions based on year 1996 traffic counts, the year to which the BPM was calibrated.

2. LOS F is caused by queues from the bridge, not volume on segment itself.

Legend: Route = Route.

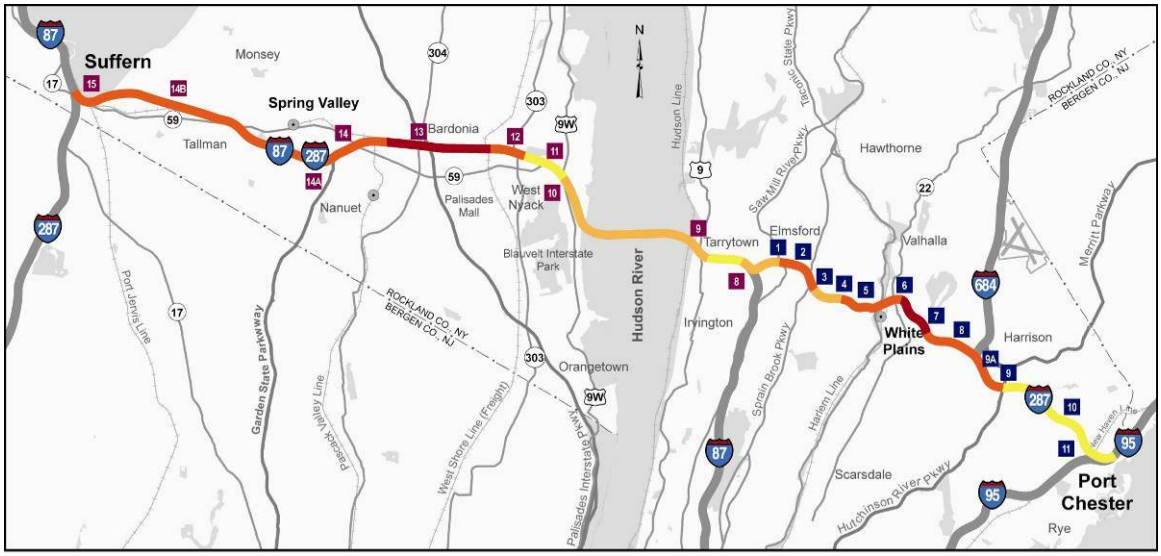
GSP = Garden State Parkway

PIP = Palisades Interstate Parkway

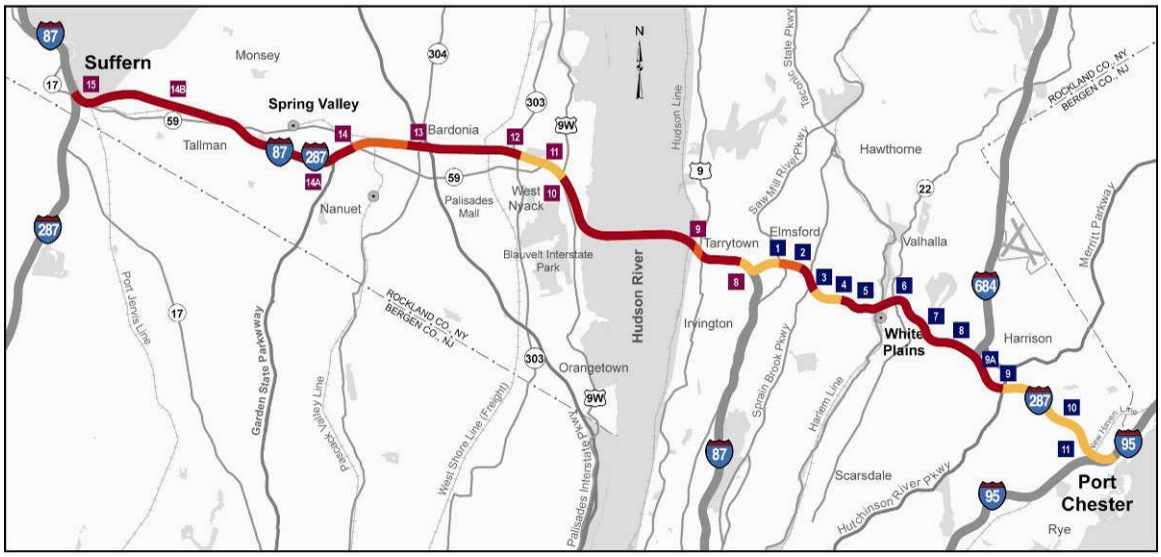
CWE = Cross Westchester Expressway

CWP = Central Westchester Parkway

HRP = Hutchinson River Parkway



Existing Mainline LOS
PM Peak Hour Westbound



No Build 2025 Mainline LOS
PM Peak Hour Westbound

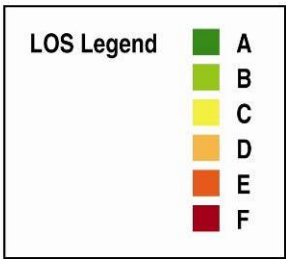


Figure D-7

Existing and No Build 2025
Mainline LOS Westbound PM Peak Hour

As part of the DEIS data collection program, traffic counts on I-87/I-287 and other roads in the corridor were collected in 2005. BPM has been recalibrated using this data to simulate the 2005 existing conditions and will be used for the regional highway analyses for the DEIS analysis years. Results of the BPM forecasts will be converted into inputs to a traffic micro-simulation package (Paramics), to analyze the LOS for the roadway network in the corridor and the results will be presented in the DEIS.

D.2.2 Safety Considerations

D.2.2.1 Accident History and Analysis

Accident rates were calculated using NYSTA data from the Accident Reporting System (ARS) by milepost, NYSDOT SASS (State Accident Surveillance System) data by reference marker, NYSDOT CLASS (Centralized Local Accident Surveillance System) data by node number, and traffic volumes from counts conducted as part of this project. Accident rates are a function of the number of accidents over a period of time, length of highway (as appropriate), and the traffic volume at that location. A roadway with a higher volume of vehicles would generally experience a higher number of accidents. Accident rates per million vehicle miles of travel (MVM) on the I-87/I-287 mainline were estimated based on the following formula:

$$\text{Number of Accidents per MVM} = \frac{(\text{number of accidents per year}) \times (1{,}000{,}000)}{(\text{length of section in miles}) \times (\text{AADT volume}) \times 365 \text{ days per year}}$$

For intersection and ramp locations, accident rates were calculated in terms of the number of accidents per million entering vehicles (MEV) based on the following formula:

$$\text{Number of Accidents per MEV} = \frac{(\text{number of accidents per year}) \times (1{,}000{,}000)}{(\text{entering AADT volume}) \times 365 \text{ days per year}}$$

Accident rates on each segment or at each intersection were calculated from the number of accidents over a 36-month period from July 1, 2004 to June 30, 2007. The calculated accident rates were compared to Statewide Average (SWA) accident rates for similar facility types. Locations or segments that had a calculated accident rate of at least twice the SWA have been identified for further analysis in the DEIS.

Table D-6 presents the segments on the I-87/I-287 mainline where calculated accident rates exceeded the SWA by two times. Accident rates for the I-87/I-287 intersections, entrance and exit ramps on the mainline and ramp intersections on the local street network, are shown on Table D-7 for those locations that exceeded the SWA by two times. In Table D-7, “N/A” means that traffic volume data was not available for one or more approaches at that intersection, and an accident rate could not be calculated.

Traffic accident data for the most recent three years available, July 1, 2004 to June 30, 2007, indicate that 10 segments on the I-87/I-287 mainline and 41 intersections on entrance and exit ramps and at local intersections have accident rates that are twice the SWA.

Table D–6

Identification of I-87/I-287 Mainline Segments at Twice the Statewide Average Accident Rate

Segment Description (FROM : TO)	AADT	Total Accidents for 3 yrs	Distance (Miles)	Accident Rate	SWA	Twice SWA?
Exit 12 NYC - I-95 South-US 1 North : Exit 11 Port Chester-Rye-US 1 South	88,797	31	0.11	2.90	1.04	Yes
Exit 11 Port Chester-Rye-US 1 South : Exit 10 Westchester Ave-Purchase-Port Chester-Routes.120 &120A	84,486	172	1.56	1.19	1.04	No
Exit 10 Westchester Ave-Purchase-Port Chester-Routes.120 &120A : Exit 9 Hutchinson River Pkwy-Whitestone Br.	97,063	105	1.14	0.87	1.04	No
Exit 9 Hutchinson River Pkwy-Whitestone Br. : Exit 9A Brewster - I-684	102,617	210	1.09	1.71	1.04	No
Exit 9A Brewster - I-684 : Exit 8 Westchester Ave	111,589	259	1.27	1.67	1.04	No
Exit 8 Westchester Ave: Exit 7 Central Westchester Pkwy. North	136,659	355	1.1	2.16	1.04	Yes
Exit 7 Central Westchester Pkwy. North: Exit 6 White Plains - Route. 22 (Broadway)	125,947	79	0.27	2.12	1.04	Yes
* Exit 6 White Plains - Route. 22 (Broadway): Exit 5 Hillside Ave. - Routes. 100 & 119 (Tarrytown-White Plains Rd.)	117,500	242	1.17	1.61	1.04	No
* Exit 5 Hillside Ave. - Routes. 100 & 119 (Tarrytown-White Plains Rd.): Exit 4 Hartsdale-Route. 100A (Knollwood Rd.)	146,300	228	0.72	1.98	1.04	No
* Exit 4 Hartsdale - Route. 100A (Knollwood Rd.): Exit 3 Sprain Brook Pkwy.	133,300	178	0.64	1.91	1.04	No
Exit 3 Sprain Brook pkwy. : Exit 2 Elmsford - Route. 9A (Saw Mill River Rd.)	113,605	125	0.41	2.45	1.04	Yes
Exit 2 Elmsford - Route. 9A (Saw Mill River Rd.): Exit 1 Saw Mill River Pkwy. - Route. 119	97,803	164	0.62	2.47	1.04	Yes
Exit 1 Saw Mill River Pkwy. - Route. 119: I-287 (CWE begins)	83,670	90	0.17	5.78	1.04	Yes
Int. 8 White Plains - Elmsford - I-287(CWE) - Route. 119: Int. 9 Tarrytown - US 9 - Route. 119	109,298	394	1.53	2.15	1.04	Yes
Int. 9 Tarrytown - US 9 - Route. 119: Int. 10 Nyack - So. Nyack - US 9W – Route. 59	139,400	1,645	3.89	2.77	1.37	Yes
* Int. 10 Nyack - So. Nyack - US 9W - Route. 59 : Int. 11 Nyack - US 9W & Route.59	123,730	261	0.66	2.92	1.04	Yes
* Int. 11 Nyack - US 9W & Route.59: Int. 12 West Nyack - Route. 303	128,900	384	1.33	2.05	1.04	No
Int. 12 West Nyack - Route. 303 : Int. 13 Palisades Interstate Pkwy	133,722	509	2.17	1.60	1.04	No
Int. 13 Palisades Interstate Pkwy: Int. 14 Spring Valley - Nanuet - Route. 59	137,636	387	1.85	1.39	1.04	No
Int. 14 Spring Valley - Nanuet - Route. 59: Int. 14A Garden State Pkwy. Conn. to Pascack Rd.	140,000	324	0.72	2.93	1.04	Yes
Int. 14A Garden State Pkwy. Conn. to Pascack Rd. : Int. 14B Airmont Rd.	117,195	531	4.08	1.01	1.04	No
Int. 14B Airmont Rd. : Int. 15 I-87/I-287 Overlap Ends	105,282	223	2.88	0.67	1.04	No
* Note: AADT was not available from traffic counts conducted for this project, so 2005 AADT from NYSDOT Traffic Volume Report was used.						

Table D–7

Identification of I-87/I-287 Intersections and Ramps at Twice the Statewide Average Accident Rate

Locations	SWA	AADT	Total Accidents for 3 Yrs	Calculated Accident Rate	Twice SWA?
Exit 12 WB I-287 Off-Ramp to SB New England Thruway (I-95)	0.08	22,591	0	-	N/A
SB New England Thruway (I-95) Diverge With WB I-287	0.05	-	0	-	N/A
NB New England Thruway Merge With EB I-287	0.03	-	1	-	N/A
NB New England Thruway (I-95) On-Ramp to WB I-287 at Exit 12	0.03	37,526	4	0.10	Yes
Exit 12 EB I-287 Off-Ramp to SB New England Thruway (I-95)	0.08	30,468	2	0.06	No
Boston Post Road On-Ramp to WB I-287 at Exit 11	0.03	43,617	4	0.08	Yes
Exit 11 EB I-287 Off-Ramp to Boston Post Road	0.05	-	16	-	N/A
Boston Post Road at EB I-287 On/Off-Ramp	0.19	-	8	-	N/A
Boston Post Road at WB I-287 On-Ramp	0.05	-	2	-	N/A
Exit 10 WB I-287 Off-Ramp to Bowman Avenue	0.05	43,617	4	0.08	No
Westchester Avenue On-Ramp to WB I-287 at Exit 10	0.03	48,436	0	-	N/A
Westchester Avenue at Webb Avenue	0.16	-	2	-	N/A
Exit 10 EB I-287 Off-Ramp to Westchester Avenue	0.05	48,627	6	0.11	Yes
Bowman Avenue at Webb Avenue / WB I-287 Off-Ramp	0.34	12,472	0	-	N/A
Westchester Avenue at Kenilworth Road	0.34	-	31	-	N/A
Exit 9 N-S WB I-287 Off-Ramp to Westchester Avenue	0.05	48,436	2	0.04	No
Westchester Avenue On-Ramp to WB I-287 at Exit 9N-S	0.03	52,940	5	0.09	Yes
Westchester Avenue On-Ramp to EB I-287 at Exit 9S-N	0.03	-	0	-	N/A
Exit 9S-N EB I-287 Off-Ramp to Westchester Avenue	0.05	64,937	13	0.18	Yes
Exit 9A WB I-287 Off-Ramp to NB I-684	0.05	52,940	4	0.07	No
SB I-684 On-Ramp to EB I-287 at Exit 9A	0.03	64,937	5	0.07	Yes
Exit 9A EB I-287 Off-Ramp to NB I-684	0.05	57,224	11	0.18	Yes
SB I-684 On-Ramp to WB I-287 at Exit 9A	0.03	54,365	17	0.29	Yes
WB Westchester Avenue On-Ramp to WB I-287 at Exit 8	0.03	-	5	-	N/A
WB Westchester Avenue at Anderson Hill Road	0.08	-	4	-	N/A
WB Westchester Avenue at White Plains Avenue	0.26	-	1	-	N/A
EB Westchester Avenue On-Ramp to EB I-287 at Exit 8E	0.03	67,555	4	0.05	No
White Plains Avenue at I-287 On/Off-Ramp	0.34	10,517	0	-	N/A
Exit 8E EB I-287 Off-Ramp to Westchester Avenue	0.05	66,173	1	0.01	No
Bloomingdale Road at I-287 On/Off-Ramp	0.18	-	7	-	N/A
Exit 8W EB I-287 Off-Ramp to Bloomingdale Road	0.05	79,279	5	0.06	No
Bloomingdale Road On-Ramp to WB I-287 at Exit 7	0.03	63,669	3	0.04	No
Exit 7 WB I-287 Off-Ramp to Central Westchester Parkway	0.05	63,670	7	0.10	Yes
SB Central Westchester Parkway at Grant Avenue	0.08	-	2	-	N/A
Central Westchester Parkway On-Ramp to EB I-287 at Exit 7	0.03	72,989	7	0.09	Yes
Exit 6 WB I-287 Off-Ramp to Orchard Street	0.05	55,101	3	0.05	No
Orchard Street at WB I-287 On / Off-Ramp	0.19	-	3	-	N/A
Orchard Street On-Ramp to WB I-287 at Exit 6	0.03	-	7	-	N/A
Exit 6 EB I-287 Off-Ramp to N. Broadway	0.05	77,140	6	0.07	No
N. Broadway at EB I-287 On/Off-Ramp	0.26	-	4	-	N/A
N. Broadway On-Ramp to EB I-287 at Exit 6	0.03	70,846	3	0.04	No

Table D–7 (con't)

Identification of I-87/I-287 Intersections and Ramps at Twice the Statewide Average Accident Rate

Locations	SWA	AADT	Total Accidents for 3 Yrs	Calculated Accident Rate	Twice SWA?
Tarrytown Road (Route 119) On-Ramp to WB I-287 at Exit 5	0.03	-	10	-	N/A
Exit 5 WB I-287 Off-Ramp to Hillside Avenue (Route 100)	0.05	-	5	-	N/A
Tarrytown Road (Route 119) On-Ramp to EB I-287 at Exit 5	0.03	77,140	3	0.04	No
Exit 5 EB I-287 Off-Ramp to Tarrytown Road (Route 119)	0.05	81,481	11	0.12	Yes
Exit 4 WB I-287 Off-Ramp to Knollwood Road (Route 100A)	0.05	-	5	-	N/A
Knollwood Road (Route 100A) On-Ramp to WB I-287 at Exit 4	0.03	-	3	-	N/A
Exit 4 EB I-287 Off-Ramp to Knollwood Road (Route 100A)	0.05	-	10	-	N/A
Knollwood Road (Route 100A) at EB I-87/287 On / Off-Ramp	0.34	-	25	-	N/A
Knollwood Road (Route 100A) at WB I-87/287 On / Off-Ramp	0.34	-	4	-	N/A
Knollwood Road (Route 100A) On-Ramp to EB I-287 at Exit 4	0.03	81,481	4	0.04	No
Exit 3 WB I-287 Off-Ramp to Sprain Brook Parkway	0.05	41,962	11	0.24	Yes
Sprain Brook Parkway On-Ramp to WB I-287 at Exit 3	0.03	53,688	6	0.10	Yes
Exit 3 EB I-287 Off-Ramp to SB Sprain Brook Parkway	0.05	59,917	2	0.03	No
NB Sprain Brook Parkway On-Ramp to EB I-287 at Exit 3	0.03	-	3	-	N/A
SB Sprain Brook Parkway On-Ramp to EB I-287 at Exit 3	0.03	-	10	-	N/A
Exit 2 WB I-287 Off-Ramp to Saw Mill River Road	0.05	42,479	11	0.24	Yes
Saw Mill River Road On-Ramp to WB I-287 at Exit 2	0.19	47,351	3	0.06	No
White Plains Avenue at WB I-287 On / Off Ramp	0.34	-	11	-	N/A
Frontage Street at EB I-287 On-Ramp	0.06	-	2	-	N/A
Frontage Street On-Ramp to EB I-287 at Exit 2	0.03	59,917	9	0.14	Yes
Exit 1 WB I-287 Off-Ramp to White Plains Road (Route 119)	0.05	47,351	20	0.39	Yes
White Plains Road (Route 119) at WB I-287 On/Off-Ramp	0.06	-	1	-	N/A
White Plains Road (Route 119) On-Ramp to WB I-287 at Exit 1	0.06	47,738	0	-	N/A
NB I-87 On-Ramp to EB I-287 Main Line at Interchange 8	0.03	44,192	5	0.10	Yes
NB I-87 On-Ramp to WB I-287 Main Line at Interchange 8	0.03	53,584	5	0.09	Yes
EB I-287 Off-Ramp to SB I-87 Main Line at Interchange 8	0.05	55,714	21	0.34	Yes
WB I-287 Off-Ramp to SB I-87 Main Line at Interchange 8	0.05	39,479	14	0.32	Yes
White Plains Road (Route 119) On-Ramp to EB I-287 at Exit 1	0.03	50,452	3	0.05	No
Exit 1 EB I-287 Off-Ramp to White Plains Road (Route 119)	0.05	-	3	-	N/A
Interchange 9 WB I-87/287 Off-Ramp to White Plains Road (Route 119)	0.05	53,584	3	0.05	No
White Plains Road (Route 119) at WB I-87/287 Interchange 9 On / Off-Ramp	0.34	-	1	-	N/A
White Plains Road (Route 119) On-Ramp to WB I-87/287 Interchange 9	0.03	50,852	2	0.04	No
Broadway (Route 9) On-Ramp to WB I-87/287 Interchange 9	0.08	54,843	2	0.03	No
Broadway (Route 9) at White Plains Road (Route 119)	0.34	-	9	-	N/A
Broadway (Route 9) at EB I-287 Interchange 9 On/Off-Ramp	0.34	-	5	-	N/A
Broadway (Route 9) On-Ramp to EB I-87/287 Interchange 9	0.03	55,714	3	0.05	No
Interchange 9 EB I-87/287 Off-Ramp to Broadway (Route 9)	0.05	-	4	-	N/A
Clinton Avenue at Franklin Street / I-87/287 Interchange 10 Off-Ramp	0.34	-	3	-	N/A
Interchange 10 WB I-87/287 Off-Ramp to Route 9W	0.05	54,843	11	0.18	Yes

Table D–7 (con't)

Identification of I-87/I-287 Intersections and Ramps at Twice the Statewide Average Accident Rate

Locations	SWA	AADT	Total Accidents for 3 Yrs	Calculated Accident Rate	Twice SWA?
Route 9W On-Ramp to WB I-87/287 Interchange 10	0.03	49,904	2	0.04	No
Route 9W On-Ramp to EB I-87/287 Interchange 10	0.03	-	6	-	N/A
Interchange 11 WB I-87/287 Off-Ramp to High Avenue	0.05	49,904	5	0.09	No
High Avenue On-Ramp to WB I-87/287 Interchange 11	0.03	52,602	1	0.02	No
High Avenue at WB I-87/287 On/Off-Ramps	0.34	-	1	-	N/A
Interchange 11 EB I-87/287 Off-Ramp to Korean War Veterans Memorial Highway	0.05	-	6	-	N/A
Mountainview Avenue at EB I-87/287 Interchange 11 On-Ramp	0.04	-	24	-	N/A
Korean War Veteran Memorial Highway at EB I-87/287 Interchange 11 Off-Ramp	0.26	28,613	1	0.03	No
Mountainview Avenue On-Ramp to EB I-87/287 Interchange 11	0.03	-	1	-	N/A
Interchange 12 WB I-87/287 Off-Ramp to N. Palisades Center Drive	0.05	52,602	16	0.28	Yes
N. Palisades Center Drive to WB I-87/287 Interchange 12 On-Ramp	0.03	65,787	7	0.10	Yes
Snake Hill Rd. at WB I-87/287 Interchange 12 On / Off-Ramp	0.19	-	9	-	N/A
Interchange 12 EB I-87/287 Off-Ramp to Palisades Center Drive	0.05	67,935	8	0.11	Yes
Palisades Center Drive at Route 303	0.26	-	8	-	N/A
Palisades Center Drive at EB I-87/287 Interchange 12 On/Off-Ramp	0.19	-	4	-	N/A
Palisades Center Drive On-Ramp to EB I-87/287 Interchange 12	0.03	-	9	-	N/A
Interchange 13N WB I-87/287 Off-Ramp to NB Palisades Parkway	0.05	65,787	15	0.21	Yes
NB Palisades Parkway to WB I-87/297 Interchange 13N On-Ramp	0.03	66,465	1	0.01	No
NB Palisades Parkway to EB I-87/287 Interchange 13N On-Ramp	0.03	67,935	8	0.11	Yes
Interchange 13N EB I-87/287 Off-Ramp to NB Palisades Parkway	0.05	70,285	2	0.03	No
Interchange 13S WB I-87/287 Off-Ramp to SB Palisades Parkway	0.05	66,465	10	0.14	Yes
SB Palisades Parkway to WB I-87/297 Interchange 13S On-Ramp	0.03	68,793	6	0.08	Yes
SB Palisades Parkway to EB I-87/287 Interchange 13S On-Ramp	0.03	68,547	1	0.01	No
Interchange 13S EB I-87/287 Off-Ramp to SB Palisades Parkway	0.05	68,843	8	0.11	Yes
Interchange 14 WB I-87/287 Off-Ramp to Korean War Veteran Memorial Highway	0.05	68,793	16	0.21	Yes
Korean War Veteran Memorial Highway at WB I-87/287 Interchange 14 On / Off-Ramp	0.26	51,413	5	0.09	No
Korean War Veteran Memorial Highway On-Ramp to WB I-87/287 Interchange 14	0.03	69,382	4	0.05	No
Korean War Veterans Memorial Highway at EB I-87/287 Interchange 14 On / Off-Ramp	0.26	-	21	-	N/A

Table D–7 (con't)

Identification of I-87/I-287 Intersections and Ramps at Twice the Statewide Average Accident Rate

Locations	SWA	AADT	Total Accidents for 3 Yrs	Calculated Accident Rate	Twice SWA?
Old Nyack Turnpike On-Ramp to EB I-87/287 Interchange 14	0.03	3,268	15	0.16	Yes
Old Nyack Turnpike at Korean War Veterans Memorial Highway	0.18	-	15	-	N/A
Interchange 14 EB I-87/287 Off-Ramp to Korean War Veterans Memorial Highway	0.05	83,268	12	0.13	Yes
Korean War Veterans Memorial Highway On-Ramp to EB I-87/287 Interchange 14	0.03	68,843	5	0.07	Yes
Interchange 14A EB I-87/287 Off-Ramp to SB Garden State Parkway	0.05	65,950	5	0.07	No
Interchange 14A WB I-87/287 Off-Ramp to SB Garden State Parkway	0.05	69,382	21	0.28	Yes
NB Garden State Parkway to WB I-87/287 On-Ramp	0.03	1,246	13	0.23	Yes
NB Garden State Parkway On-Ramp to EB I-87/287 Interchange 14A	0.03	7,874	3	0.04	No
Interchange 14B WB I-87/287 Off-Ramp to N. Airmont Road	0.05	1,246	23	0.41	Yes
N. Airmont Road at WB I-87/287 Interchange 14B On/Off-Ramp	0.19	-	22	-	N/A
N. Airmont Road On-Ramp to EB I-87/287 Interchange 14B	0.03	65,950	5	0.07	Yes
Interchange 14B EB I-87/I-287 Off-Ramp to N. Airmont Road	0.05	59,703	3	0.05	No
N. Airmont Road at EB I-87/287 Interchange 14B On/Off-Ramp	0.19	-	5	-	N/A
N. Airmont Road On-Ramp to WB I-87/287 Interchange 14B	0.03	5,579	4	0.08	Yes
Interchange 15 WB I-87/287 Off-Ramp to SB I-287	0.05	45,579	13	0.26	Yes
NB I-287 On-Ramp to NB I-87 Interchange 15	0.03	62,003	4	0.06	No
Interchange 15 SB I-87 Off-Ramp to SB I-287	0.05	69,412	8	0.11	Yes
NB I-287 On-Ramp to EB I-87/287 Interchange 15	0.03	59,703	6	0.09	Yes

EB = Eastbound; WB = Westbound; NB = Northbound; SB = Southbound.

D.2.2.2 Existing Police, Fire Protection and Ambulance Access

The Thruway and the CWE are patrolled by State Police Troop T, based in Tarrytown. In addition, there are several local ambulance services that provide basic life support along the corridor. NYSTA maintains a list that identifies an ambulance service provider for every stretch of the highway. Nine ambulance services tend to the Thruway portion within the corridor, and one service tends to the CWE, (Table D-8). Similarly, NYSTA maintains a list of the fire departments that would be called on to respond for every stretch of the highway. Fourteen fire departments tend to the Thruway portion within the corridor, and one department tends to the CWE (Table D-9).

D.2.2.3 Parking Regulations and Parking-Related Conditions

As access-controlled facilities, the Thruway and the CWE only include parking facilities at designated rest areas, none of which are located within the study boundaries. A park-and-ride lot for bus commuters is located just off the Thruway at Interchange 14, along with a truck parking area. Another similar park-and-ride lot is located to the west of the Palisades Mall, referred to as Lot J.

D.2.2.4 Lighting

Roadway lighting is generally not provided along the corridor in Rockland and Westchester Counties. The exceptions where lighting is provided are the Tappan Zee Bridge, where the approaches, toll plaza and bridge are lit by means of overhead mast-arm-mounted lighting on both the north and south sides at intervals of approximately 250 feet. Lighting is also provided at the Spring Valley Toll Plaza west of Interchange 14A, and the westbound entrance and exit ramps at the Interchange 14 at the Tandem Lot (truck parking facility).

D.2.3 Shared-Use Facilities

D.2.3.1 Pedestrians and Bicyclists

Currently pedestrians and bicyclists are prohibited by New York State law on the Thruway and the CWE because they are both interstate highways. Similarly, bicyclists are not granted access nor provided with dedicated facilities on either the Thruway or the CWE. In addition, there are no pedestrian or bicycle facilities on the Tappan Zee Bridge. However, one of the project's goals and objectives is to provide for non-motorized means of travel, such as bicycle and pedestrian traffic across the Hudson River. To meet this need, the DEIS Tappan Zee Bridge replacement options may include a shared use facility for both pedestrians and bicycles that could connect to existing or proposed facilities on both shores. This and other initiatives will be evaluated during the DEIS.

There are a number of pedestrian and bicycle trails that cross the corridor and are part of an existing regional system of bicycle and pedestrian facilities or planned shared use facilities. These are listed in the following subchapter.

Table D–8

Ambulance Services through the Corridor by Milepost

Ambulance Company	New York Division Milepost Limits
Westchester County	I-287, MP 0.0 to 10.78
Empress	I-87, MP 0.0 to 5
Ardsley	I-87, MP 5.5 to 5.9 & 7.5 to 7.8
Dobbs Ferry	I-87, MP 7.8 to 9.0
Tarrytown Volunteer	I-87, MP 12.0 to 14.7
Nyack Community Ambulance	I-87, MP 14.67 to 19.46
Nanuet Community Ambulance	I-87, MP 19.46 to 23.5 + GSP Extension
William Paul Faist Volunteer Ambulance Corps	MP 23.5 – 24.62 + GSP Extension
Ramapo Valley	I-87, MP 24.62 to 31.78
Sloatsburg Volunteer	I-87, MP 31.78 to 35.27 & Sloatsburg/Ramapo

Table D–9

Fire Departments through the Corridor by Milepost

Fire Department	New York Division Milepost Limits
Westchester County Fire Department	I-287 MP CW 0.00 to MP 10.78
Yonkers Fire Department	I-87, MP 0.0 to 5.5
Ardsley Fire Department	I-87, MP 5.5 to 7.0
Tarrytown Fire Department	I-87, MP 7.0 to 12.85
Tappan Zee Bridge	I-87, MP 12.85 to 16.75
Nyack Fire Department	I-87, MP 16.75 to 17.93
Central Nyack Fire Department	I-87, MP 17.93 to 18.76 + Tappan Zee Bridge
West Nyack Fire Department	I-87, MP 18.76 to 20.07
Nanuet Fire Department	I-87, MP 20.07 to 22.08
Spring Valley Fire Department	I-87, MP 22.08 to 23.02
South Spring Valley Fire Department	I-87, MP 23.2 to 24.62 + GSP Extension
Tallman Fire Department	I-87, MP 24.62 sb
Monsey Fire Department	I-87, MP 28.47 nb
Suffern Fire Department	I-87, MP 28.47 to 33.03
Hillburn Fire Department	I-87, MP 30.03 to 33.0 + Suffern Tandem lot

D.2.3.2 Multi-Use Paths and Trails

There are a number of existing and planned multi-use shared use paths, within linear greenways, along the corridor. These bicycle and pedestrian facilities are being developed by the NYSDOT, the Hudson River Valley Greenway Council/Conservancy and local governments on both sides of the Hudson River. The following is a listing of the major facilities open to the public or are in the process of being developed:

Rockland County

- Bear Mountain Trail begins at the base of Harriman State Park in Suffern as a hiking trail.
- Palisades Interstate Park Trailway within the right-of-way of the PIP, first section from New Jersey State Line to Route 303 in Orangetown has been constructed other sections are in design. This is a paved multi-use trailway for pedestrians and bicyclists that is planned from the New Jersey State Line to the Anthony Wayne Recreation Area in Bear Mountain State Park.
- Nyack Rail Trail from South Nyack to Piermont a portion of which is referred to as the Raymond G. Esposito Memorial Trail. The trail is suitable for hiking and mountain biking and passes over the corridor alongside northbound Route 9W at Interchange 10.
- Long Path hiking trail passes over the Thruway at Mountainview Avenue, at Interchange 11 as it extends from the George Washington Bridge to near Albany.
- Ramapo River Greenway Trail - this trailway is planned from Suffern to Harriman.

Westchester County

- River Walk trail is under development along the eastern shore of the Hudson River. It is expected to pass beneath the east approach of the Tappan Zee Bridge.
- Old Croton Aqueduct Trailway easement on top of the Old Croton Aqueduct is used as a trail for pedestrians and bicycles on either side of the Thruway.
- South County Trailway and North County Trailway both follow the former New York Central Putnam Division track bed but are interrupted by detours at Route 119 and the CWE. Both are paved and open for pedestrians and bicycles.
- Bronx River Pathway runs along the Bronx River Parkway corridor and passing beneath the CWE between Exits 5 and 6. It is open for pedestrians and bicycles.
- East Coast Greenway-Hutchinson River Parkway Trailway - proposed multi-use trailway from New York City to Connecticut- currently open as an equestrian path.
- Old Croton Aqueduct State Park and Trailway.

D.2.3.3 Access to Recreation/Park Areas

There are several parks adjacent to the corridor in both Rockland and Westchester Counties:

Rockland County

- In Suffern the Palisades Interstate Park (Harriman State Park) is adjacent to the north, largely in the form of a rock cliff face. The Suffern Bear Mountain Trail begins here.
- In Monsey, the highway is located adjacent and between two parks, Monsey Glen Park, to the north, which has its access away from the highway, and Lillian G. and Frank J. Schwartz Memorial Park, which is undeveloped, with no apparent entrance.
- In Clarkstown, the highway is immediately south of Mountainview Nature Park, which has a rock cliff face adjacent to the highway, and an entrance off North Greenbush Road about 200 feet north of the highway.
- In South Nyack, Elizabeth Place Park is adjacent to the south side of the highway and its entrance from Elizabeth Place is adjacent to the highway; an unnamed sitting area is across South Broadway from Elizabeth Place adjacent to the highway.

Westchester County

- Yosemite Park is located adjacent to the south of the CWE in the Fairview neighborhood of Greenburgh, with its entrance at the opposite side of the park from the highway.
- Fulton Park is an undeveloped land strip adjacent to the south of the CWE, also in Greenburgh, with its entrance adjacent to the highway at Old Kensico Road.
- Bordering Greenburgh and White Plains is the Bronx River Pathway Reservation, a mixed-use recreation space along the Bronx River Parkway.
- In White Plains, Tibbits Park is a landscaped linear space cut by local streets in the center of downtown White Plains.
- Abendroth Park is located adjacent to the north of the CWE in both Port Chester and Rye Brook, with its entrance at the opposite side of the park to the highway.

D.2.4 Existing Highway Infrastructure: I-87/I-287 Mainline and Intersecting Highways and Roadways

D.2.4.1 I-87/I-287 Mainline

D.2.4.1.1 I-87/I-287 Mainline - Functional Classification and National Highway System (NHS)

The Thruway is identified as I-87 on its north-south alignment between Albany and New York City. It is one of 80 High Priority Corridors within the NHS. With its east-west segment across Rockland County, the Thruway also carries the I-287 designation, since it forms part of a circumferential interstate system around the periphery of the Greater New York Metropolitan Area. The CWE is also designated as I-287, since it serves as the continuation of the circumferential system. The Thruway and CWE comprise part of the NHS Truck Access Route system, (Table D-10). In addition to providing continuity for I-87 and I-287, the Thruway and the CWE enhance the interstate network with connections to I-684 and I-95.

Table D-10

Functional Classification – I-87/I-287 Mainline

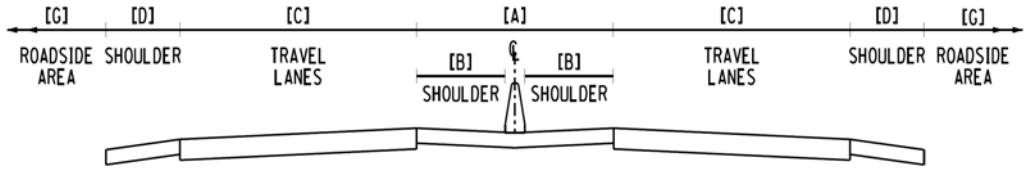
Roadway	Functional Class	NHS	Qualifying Highway
New York State Thruway, I-87/I-287 in Rockland County	Interstate Freeway	Yes	Yes
New York State Thruway, I-87/I-287 in Westchester County	Interstate Freeway	Yes	Yes
Cross Westchester Expressway, I-287 In Westchester County	Interstate Freeway	Yes	Yes

D.2.4.1.2 I-87/I-287 Mainline - Existing Highway Cross Section

Within the corridor the Thruway and the CWE are essentially six-lane fully-shouldered facilities, providing three continuous travel lanes in each direction. Both roadways widen to four lanes west and east of the Tappan Zee Bridge and for relatively short distances at interchanges to accommodate continuous auxiliary lanes, acceleration and deceleration lanes. They also widen to five lanes at major confluences, such as merge with I-287 at the western study boundary and the Thruway/CWE merge at Interchange 8. Table D-11 and the schematic sketch below summarize the principal geometric characteristics of the Thruway and CWE through the corridor.

Table D-11
I-87/I-287 Mainline Cross-Sectional Properties

Roadway	[A] Median	[B] Left Shoulder	[C] Number of Lanes	[D] Right Shoulder	[G] Other
Thruway, Interchanges 15 to 11	20’	8-12’	3+3	9.5’-10’	Full Access Control
Thruway, Interchange 11 to Tappan Zee Bridge	10’-14’	6’	4+4	10’-12’	Full Access Control
Thruway, Tappan Zee Bridge to Interchange 8	22’	10’	4+4	10’-12’	Full Access Control
Cross Westchester Expressway, Typical	20’-26’, predominantly 22’	10’	3+3	6.5’-12’	Full Access Control
Cross Westchester Expressway, with Auxiliary Lanes	20’-26’, predominantly 22’	10’	1Aux.+ 3+3 +1 Aux.	6.5’-12’	Full Access Control



D.2.4.1.3 I-87/I-287 Mainline and Ramps - Highway Design Criteria

The highway design criteria included in Tables D-12 and D-13 applies to the Thruway and CWE mainlines and ramps in the corridor. The design criteria correspond to the 17 critical geometric elements cited in Chapter 2 of the New York State Department of Transportation’s Highway Design Manual (NYSDOT HDM) for interstate highways.

These criteria will serve as the governing standards by which the geometric characteristics of the DEIS alternatives will be assessed. Any design element falling short of its minimum or exceeding its maximum criterion will be categorized as non-standard, and a formal justification will need to be prepared and approved before it can be integrated into the corridor.

Table D-12

I-87/I-287 Mainline Geometric Standards

	Critical Design Element	Standard Criteria		Source
		Thruway	Cross Westchester Expressway	
1	Design Speed (mph)	70	60	HDM §2.7.1.1A; NYSTA
2	Minimum Lane Width (feet)	12	12	HDM §2.7.1.1B
3	Minimum Shoulder Width (feet) Left Right Right, Climbing Lane	 4, 12 Desirable 10, 12 Desirable 4, 12 Desirable	 4, 12 Desirable 10, 12 Desirable 4, 12 Desirable	HDM §2.7.1.1C, Exhibit 2-2
4	Minimum Bridge Roadway Width (feet)	Match approach highway	Match approach highway	BM §2.3.1 Table 2-1
5	Maximum Grade [Rolling]	3%	4%	HDM §2.7.1.1E, Exhibit 2-2; NYSTA
6	Horizontal Curvature, Minimum Radius (feet) @e=8% @e=6%	 1810 2040	 1200 1330	HDM §2.7.1.1F, Exhibit 2-2
7	Maximum Super-elevation Rate	8%, 6% may be used in urban and suburban areas	8%, 6% may be used in urban and suburban areas	HDM §2.7.1.1G
8	Minimum Stopping Sight Distance (feet)	730	570	HDM §2.7.1.1H, Exhibit 2-2
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail Depressed sections	 15 Shoulder width (not less than 4) Shoulder width + 2	 15 Shoulder width (not less than 4) Shoulder width + 2	HDM §2.7.1.1I
10	Mini. Vertical Clearance (feet) Vehicular Bridges Rehabilitation* Replacement** Pedestrian Bridges OH Sign Structures & Signs	 14, 14.5 Desirable 14^, 16.5 Desirable^ 15, 17.5 Desirable^^ 15, 17.5 Desirable^^	 14, 14.5 Desirable 14, 14.5 Desirable 15, 15.5 Desirable 15, 15.5 Desirable	HDM §2.7.1.1J; BM §2.4.1, Table 2-2 (Exempt Interstate^^^);
11	Pavement Cross Slope	1.5% min 2% max	1.5% min 2% max	HDM §2.7.1.1K
12	Maximum Rollover Between Lanes Edge of Traveled Way	 4% 8%	 4% 8%	HDM §2.7.1.1L
13	Structural Capacity Rehabilitation* Replacement** Temporary Bridges	 HS20, H25 Desirable HL93, NYSDOT Design Permit Vehicle HS20¤¤	 HS20, H25 Desirable HL-93, NYSDOT Design Permit Vehicle HS20¤¤	HDM §2.7.1.1M; TSDM §2.1; BM §2.6
14	Minimum Level of Service	C, D Acceptable with documentation	C, D Acceptable with documentation	HDM §2.6.14, §2.7.1.1N, Heavily Dev Urban Area
15	Control of Access	Full	Full	HDM §2.7.1.1O
16	Pedestrian Accommodation	Prohibited	Per HDM Chapter 18, ADAAG	NYS Highway Law 1, §3.2; ADAAG
17	Minimum Median Width (feet)	10 , 26 Desirable (40 at turnarounds)	10	HDM §2.7.1.1P

* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement.
^ Allow 6" additional for future resurfacing. 16.5' Desirable per TSDM §1.8.1.
^^ The 17.5' desirable vertical clearance for Ped Bridges & OH Structures & Signs is based on TSDM Sec 1.8.2
^^^ The affected portions of the Thruway and CWE are exempt from the 16' vertical clearance network.
¤¤ HS25 is to be used for temporary structures that will carry high AADT and truck traffic for more than one year.
Note 1: The Thruway and Cross Westchester Expressway are Qualifying Highways and part of the National Highway System.
Note 2: All roadways are to be reviewed and a determination made as to whether the roadway is in an urban or rural location, and the proper design criteria applied accordingly.

Table D-13

I-87/I-287 Mainline Ramps Geometric Standards

Element		Standard Criteria				Source
		Thruway Ramps			CWE Ramps	
		Loop	*Semi-Direct*	*Direct, Other*	*All*	
1	Design Speed (mph)	25, 35 Desirable	30, 35 Desirable	40, 50 Desirable	30, 35 Desirable	HDM §2.7.5.2A; NYSTA
2	Range of Minimum Lane Widths - Case II D Ramps (feet)	15 to 31 depending on radius¤	15 to 25 depending on radius	15 to 19 depending on radius	15 to 25 depending on radius	HDM §2.7.5.2B, Exhibit 2-9 (Case IID with shoulders)
3	Minimum Shoulder Width (feet) Left Right	3 6	3 6	3 6	3 6	HDM §2.7.5.2C, Exhibit 2-10
4	Minimum Bridge Roadway Width (feet)	Match ramp width	Match ramp width	Match ramp width	Match ramp width	HDM §2.7.5.2D; BM §2.3.1, Table 2-1
5	Maximum Grade [Rolling]	7%, 6% Des.	7%, 6% Des.	6%, 5% Des	7%, 6% Des.	HDM §2.7.5.2E, Exhibit 2-10
6	Horizontal Curvature, Min Radius (feet) @e=8% @e=6%	134, 314 Des 144, 340 Des	214, 314 Des 231, 340 Des	444, 758 Des 485, 833 Des	214, 314 Des 231, 340 Des	HDM §2.7.5.2F, Exhibit 2-10
7	Maximum Superelevation Rate	8%, 6% allowed in urban/suburb areas	8%, 6% allowed in urban/suburb areas	8%, 6% allowed in urban/suburb areas	8%, 6% allowed in urban/suburb areas	HDM §2.7.5.2G
8	Minimum Stopping Sight Distance (feet)	155, 250 Des	200, 250 Des	305, 425 Des	200, 250 Des	HDM §2.7.5.2H, Exhibit 2-10
9	Minimum Horizontal Clearance (feet) Left Right	3, 7 Under bridge 6, 10 Under Bridge	3, 7 Under bridge 6, 10 Under bridge	3, 7 Under bridge 6, 10 Under bridge	3, 7 Under bridge 6, 10 Under bridge	HDM §2.7.5.2I, Exhibit 2-10
10	Min. Vertical Clear. (feet) Vehicular Bridges Rehabilitation* Replacement** Pedestrian Bridges OH Sign Str. & Signs	 14, 14.5 Des 14^, 16.5 Des^ 15,17.5 Des ^^ 15, 17.5 Des^^	 14, 14.5 Des 14^, 16.5 Des^ 15, 17.5 Des^^ 15, 17.5 Des^^	 14, 14.5 Des 14^, 16.5 Des^ 15, 17.5 Des^^ 15, 17.5 Des^^	 14, 14.5 Des. 14, 14.5 Des. 15, 15.5 Des. 15, 15.5 Des	HDM §2.4.5.2J; BM §2.4.1, Table 2-2 (Exempt Interstate^^^);
11	Pavement Cross Slope	1.5% min; 2% max	1.5% min; 2% max	1.5% min; 2% max	1.5% min; 2% max	HDM §2.7.5.2K
12	Maximum Rollover Between Lanes Edge of Travel Way	 4% 8%	 4% 8%	 4% 8%	 4% 8%	HDM §2.7.5.2L
13	Structural Capacity Rehabilitation* Replacement** Temporary Bridges	HS20, H25 Des HL93, NYSDOT Design Permit Vehicle HS20¤¤	HS20, H25 Des HL93, NYSDOT Design Permit Vehicle HS20¤¤	HS20, H25 Des HL93, NYSDOT Design Permit Vehicle HS20¤¤	HS20, H25 Des HL93, NYSDOT Design Permit Vehicle HS20¤¤	HDM §2.7.5.2M; TSDM §2.1; BM §2.6
14	Minimum Level of Service	C, D Documented◊	C, D Documented◊	C, D Documented◊	C, D Documented◊	HDM §2.7.5.2N
15	Control of Access	Full	Full	Full	Full	HDM §2.7.5.2O
16	Pedestrian Accommodation	Per HDM Ch. 18 & ADAAG	Per HDM Ch. 18 & ADAAG	Per HDM Ch. 18 & ADAAG	Per HDM Ch. 18 & ADAAG	HDM §2.7.5.2P; ADAAG

* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement.
^ Allow 6" additional for future resurfacing. 16.5' Desirable per TSDM §1.8.1.
^^ The 17.5' desirable vertical clearance for Ped Bridges & OH Structures & Signs is based on TSDM Sec 1.8.2
^^^ The affected portion of the Thruway and CWE are exempt from the 16' vertical clearance network, except for the Interchange 15 ramps that connect I-287 to the south with I-87 to the north.
¤ The range is derived from HDM Table 2.9 for case IID. The 31' corresponds to the smallest permissible radius, R=134' (element 6). Interpolating between the widths for R=100' and R=150' yields ~40' for Case IID, from which the 9' provided by the shoulders (element 3) is deducted. At tangents and radii larger than 1000', for which the process yields inappropriately narrow widths, the width defaults to Case ID, at 15'. Other ramp widths are derived in similar fashion.
¤¤ HS25 is to be used for temporary structures that will carry high AADT and truck traffic for more than one year.
◊ Level of Service D is acceptable with proper documentation.
Note 1: All roadways are to be reviewed and a determination made as to whether the roadway is in an urban or rural location, and the proper design criteria applied accordingly.

D.2.4.1.4 I-87/I-287 Mainline and Ramps - Non-Standard Features

The Thruway and the CWE and their ramps were constructed in the mid-1950's conforming to the then-current AASHTO design standards. A preliminary analysis of the I-87/I-287 mainline was conducted using the 2004 base mapping prepared for this study and updated with details of recently completed NYSTA projects. The analysis indicates there are non-standard geometric features based on the current NYSDOT and AASHTO standards. The most prevalent deficiencies on the Thruway and CWE mainlines pertain to shoulder width. In many cases the standard width is reduced by roadside hardware such as overhead sign structure supports, guide rails and barriers, etc. Shoulder width is also a prevalent deficiency among the ramps. A few ramps do not provide adequate travel lane width as striped. However, the ramps' overall paved width is adequate for accommodating bypass turning vehicles and bypass provisions.

The other recurring deficiency is vertical clearance at bridges over the mainline. The bridges are individually identified by their Bridge Identification Number (BIN) as recorded by NYSDOT. Table D-17 in Subchapter D.2.4.2.3 correlates the BIN to the road or rail line that it carries. As the Level of Service along the mainline varies considerably with respect to location, direction of travel and time period it is not presented in these tables. The LOS analysis for the peak periods in the corridor is presented in Tables D-4 and D-5 in Subchapter D.2.1.7.

The non-standard features for the Thruway and CWE are presented in Table D-14. Thruway and CWE Interchange and Exit ramps are identified in Tables D-15 and D-16, respectively, by milepost – denoted by "MP" for the Thruway and "CW" for the Cross Westchester Expressway. Approximate MP locations along the corridor are as follows:

- MP 30 is at Thruway Interchange 15 in Suffern,
- MP 21 at Interchange 13 with the Palisades Interstate Parkway,
- MP 16 at the west shore of the Hudson River,
- MP 13 at the Tarrytown Toll Plaza, and
- MP 11.5 at Interchange 8 in Elmsford at the I-87/I-287 split
- CW 0.0 in Greenburgh, which marks the start of the CWE,
- CW 3.5 is near the Bronx River Parkway, between Exits 5 and 6,
- CW 5 at Exit 8, near the Westchester Mall,
- CW 7.5 at Exit 9 interchange with the Hutchinson River Parkway and
- CW 10.8 at the junction with I-95 in Port Chester.

Table D-14

I-87/I-287 Mainline - Non-Standard Geometric Features

Critical Design Element		Thruway		Cross Westchester Expressway	
		Criteria	Non-Standard Features	Criteria	Non-Standard Features
3	Min. Shoulder Width (ft) Left	4’	EB MP 22.3 [3’] WB MP 22.3, 22.8, 26.0 [3’]	4’	EB CW 3.7-5.1 [0’] WB CW 3.7-4.4, 4.7-5.5 [0’]
	Right	10’	EB MP 17.7, 22.3, 24.7-25.3, 25.6-27.3, 31.0 [8-9.9’], EB MP 16.3-16.5 , 17.7, 18.0-18.1, 18.8, 21.3, 22.9, 23.3, 23.7 [6-7.9’], EB MP 17.6, 21.2 [< 6’]; WB MP 22.3, 26.0-27.3, 27.6-28.5, 28.8-29.5 [8-9.9’], WB MP 16.4-16.5, 16.9-17.0, 17.5, 17.8-17.9, 18.7-18.8, 19.0-19.2, 20.5-20.6, 20.9-21.0, 22.8-22.9, 23.3-23.5, 31.5-32 [6-7.9’], WB MP 13.0 [<6’]	10’	EB CW 0.0, 1.0, 1.4, 1.6-1.9, 2.0, 2.6, 4.0-4.2, 4.5-5.1, 10.8 [6-7.9’]; WB CW 10.2 [8-9.9’], WB CW 0.1, 0.2, 1.0, 1.1, 1.4-1.7, 2.9, 3.7-4.2 [6-7.9’]
8	Min. Stopping Sight Distance (ft)	730’	EB MP 11.5-11.7 [525’], 12.3-12.5 [592’], 12.75-12.95 [702’], 29.8 [655’], 31.8 [585’], WB MP 12.3-12.5 [666’], 12.8-12.9 [604’], 29.8 [630’], 31.8 [590’]	570’	WB CW 0.0-0.1 [540’], 4.8-5.0 [525’]; WB/EB CW 0.12-0.22 [521’], 0.7-0.9 [526’], 1.4-1.5 [516’], 1.8-1.9 [559’], 4.6-4.7 [525’], 5.0-5.1 [551’]

Table D-15

Non-Standard Geometric Features - Thruway Ramps

Critical Design Element		Criteria	Non-Standard Features		
			Interchange 14	Interchange 13	Interchange 12
2	Min. Lane Width (ft)	15’		All ramps near N. Airmont Rd, All ramps near Garden State Parkway [11’-15’]	All ramps [11’-15’]
3	Min. Shoulder Width (ft) Left	3’		WB Entrance and Exit, near Route 59 [0-3’]	All ramps, near Palisades Interstate Parkway [0-3’]
	Right	6’			All ramps, near Palisades Interstate Parkway [3’-6’]

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Table D-15 (con't)

Non-Standard Geometric Features - Thruway Ramps

Critical Design Element		Criteria	Non-Standard Features			
			Interchange 11	Interchange 10	Interchange 9	Interchange 8
2	Min. Lane Width (ft)	15'	EB Exit (Case IIID1 for R=270', 31' min. [26']	EB Entrance ramp from Route 9W , WB Exit ramp to Route 9W [11'-15']		WB Exit to SB Thruway, EB Exit to Saw Mill River Parkway, NB Exit to I-287 EB, Saw Mill River Parkway Entrance to I-287 WB [11'-15']
3	Min. Shoulder Width (ft) Left	3'				WB to SB and NB to EB Thruway connectors [1-3']
	Right	6'	EB Exit [0-6'], EB and WB Entrance [5-6'], WB Exit [3-6']	WB Exit [2-6'],	All three Entrances [5-6'], WB Exit [1-6']	WB to SB Thruway connector [3-6']
6	Min. Radius (ft)	Semi-direct 214'			WB Entrance from Route 9 [140']	
8	Min. Stopping Sight Dist. (ft)	Semi-direct 200'			WB Entrance from Route 9 [150'], WB Entrance from Route 119 [175']	

Table D-16
Non-Standard Geometric Features - Cross Westchester Expressway Ramps

Element		Criteria	Non-Standard Features			
			Exit 1	Exit 2	Exit 3	Exit 4
2	Min. Lane Width (ft)	15’	EB Exit to Saw Mill River Parkway and Route 119 [10-15’], WB Entrance from Route 119 [12-15’]	EB Entrance and WB Exit [11-15’]	All Sprain Brook Parkway connectors [11-15’]	EB Entrance, WB Exit, WB Entrance [12-15’]
3	Min. Shoulder Width (ft) Left	3’	Saw Mill River Parkway connectors and Entrance from Route 119 [2-3’]	EB Entrance [2-3’]	WB Exit [1-3’], EB Entrance [2-3’]	All ramps [2-3’]
	Right	6’	EB Exit to Saw Mill River Parkway and Route 119 [4-6’], WB Entrance from Saw Mill River Parkway [5-6’], WB Exit to Route 119 and EB Entrance from Route 119 [3-6’]		Exit ramps [2-6’], EB Entrance from NB Sprain Brook Parkway [4-6’]	WB Entrance [4-6’]

Table D-16 (con't)

Non-Standard Geometric Features - Cross Westchester Expressway Ramps

Element		Criteria	Non-Standard Features			
			Exit 5	Exit 6	Exit 7	Exit 8
2	Min. Lane Width (ft)	15'	WB Exit to Hillside Avenue [13'-15']	EB Exit to N. Broadway, EB Entrance from N. Broadway [13'-15']		EB Exit to Westchester Avenue, WB Exit to Westchester Avenue, EB Entrance from Westchester Avenue [13'-15']
3	Min. Shoulder Width (ft) Left	3'		EB Entrance and Exit [2-3'], WB Entrance and Exit [0-3']		
	Right	6'	EB Entrance [3-4']	WB Entrance [2-6'], Other ramps [3-6']	WB Exit [2-6']	EB Exit 8W to and WB Entrance from Bloomingdale Road [3-6'], EB Exit 8E to Westchester Avenue [2-6'], EB Entrance from Westchester Avenue [5-6']
6	Min. Radius (ft)	214'		WB Entrance [150']		
8	Min. Stopping Sight Distance (ft)	200'		WB Entrance [135']		

Table D-16 (con't)

Non-Standard Geometric Features - Cross Westchester Expressway Ramps

Element		Criteria	Non-Standard Features			
			Exit 9A	Exit 9	Exit 10	Exits 11&12
2	Min. Lane Width (ft)	15'	All ramps, WB Entrance from Westchester Avenue East [13'-15']	All ramps [12'-15']	All ramps [13'-15']	EB Exit to Route 1 SB, EB Exit to I-95 SB, WB Entrance from Route 1, WB Entrance from I-95 NB [12'-15']
3	Min. Shoulder Width (ft) Left	3'	EB Entrance [2-3']		WB Entrance [2-3']	(Exit 12) WB Entrance from Midland Avenue [2-3']
	Right	6'	EB Exit to I-684, WB Exit [4-6'],	EB and WB Exits, EB Entrance [5-6']	WB Exit [5-6']	(Exit 11) EB Exit to Route 1 [5-6'] (Exit 12) WB Entrance from Midland Avenue [5-6']
6	Min. Radius (ft)	214'				WB Entrance from Midland Avenue [150']
8	Min. Stopping Sight Dist. (ft)	200'				(Exit 12) WB Entrance from Midland Avenue [175']

D.2.4.2 I-87/I-287 Mainline - Pavement Evaluation

The existing full-depth pavement cross-section in Rockland County is the original construction and over 50 years old. However, within the last 5 years the entire I-87/I-287 roadway pavement in Rockland County has been resurfaced. The west end, from Interchange 15 to Interchange 14 was resurfaced in 2007, along with the section between Interchange 11 and the Tappan Zee Bridge. The pavement between Interchange 14 and Interchange 11 was similarly resurfaced in 2005. To the east of the Tappan Zee Bridge, the pavement was resurfaced as part of the widening associated with the reconstruction of Interchange 8 in 2003 and 2004. There have been locations of “spot” full depth pavement reconstruction included in the resurfacing projects when determined to be required to maintain the safety of the roadway.

A typical quantified measure of pavement roughness is the International Roughness Indexes (IRI). It is generally defined as an expression of irregularities in the pavement surface that adversely affect the ride quality of a vehicle. The scale used by NYSTA ranges from 0 to 170, with higher values indicating rougher pavement. Values less than 95 are considered good, (new or almost new pavement); 95 to 119 are considered fair, (needs improvement in the near future depending on traffic volume); 120 and 170 are considered mediocre, (needs improvement in the near future to preserve usability) and greater than 170 are poor, (needs immediate improvement). Another measure of pavement condition is the Windshield Sufficiency Score that rates pavement distress condition and pavement ride on a scale of 1 to 10, with 10 being excellent and anything less than 5 is poor. Scores are based on the observed amount and severity of pavement cracking, faulting, wheel track rutting and patching.

For eastbound Thruway the IRI averaged 132.40 and the westbound 120.23 in 2007. The Windshield Sufficiency Score averages were 7.28 and 7.47. The 2007 IRIs for the CWE averaged 139.95 eastbound and 169.00 westbound and corresponding Windshield Sufficiency Scores of 8.00 and 7.59, respectively. Detailed investigations of the Thruway pavement conditions will be carried out for the DEIS.

D.2.4.2.1 I-87/I-287 Mainline - Drainage Systems

In Rockland County, Thruway runoff is managed in accordance with the New York State Department of Environmental Conservation's General Permits for Stormwater Management at Construction Sites. Roadway ditches and swales are some common ways to manage stormwater runoff from the roadway, or from stormwater collection systems designed for interstate highway use. The runoff is then discharged from these stormwater systems for eventual discharge to nearby water bodies in accordance with the General Permit. Isolated closed stormwater conveyance systems are used at several interchange locations that discharge into adjacent water bodies.

In Westchester County, consistent with local surface water conditions, CWE runoff is conveyed from the roadway in various manners. In the more urbanized areas, such as Elmwood and White Plains, stormwater runoff is collected and conveyed by fairly extensive closed stormwater systems. In less dense areas, the stormwater runoff is carried through shorter collection systems to discharge into roadside ditches and swales that eventually discharge to adjacent waterbodies."

Existing detention facilities are limited, with dedicated receiving basins located only at Interchange 15 of the Thruway and Exit 1 of the CWE.

D.2.4.2.2 I-87/I-287 Mainline - Geotechnical

Geotechnical investigations were conducted in the corridor when the Thruway and the CWE were initially constructed. Additional investigations, including the Hudson River crossing, have been undertaken as part of this study. As would be expected over a long length, the data indicates that the stratigraphy is complex and highly variable, yet also suggests that the land portions consist primarily of different sand deposits, at varying depths over rock. Detailed information is presented in a *Geotechnical Data Report* (Meuser Rutledge, 2007).

D.2.4.2.3 Structures Carrying I-87/I-287 Mainline

The condition ratings of the structures carrying the I-87/I-287 mainline including their identification number, facility carried, facility crossed, and inspection date are presented in Table D-17. Bridge inspection ratings are based on the following connotations:

1. Total deteriorated or in a failed condition.
2. Used as a shade between Ratings 1 and 3.
3. Serious deterioration or not functioning as originally designed.
4. Used as a shade between Ratings 3 and 5.
5. Minor deterioration but functioning as originally designed.
6. Used as a shade between Ratings 5 and 7.
7. New Condition. No deterioration.

Ratings below 5 are indicative of the onset of serious deterioration and deemed deficient.

Table D-17

Condition Ratings, I-87/I-287 Bridges over Crossroads, Rail Lines, and Water Bodies

Bridge ID Number	Carried	Crossed	Inspection Date	Condition Rating
Rockland County				
5027611	I-87 SB	NJ Transit RR Tracks/NY Route 59	11/30/2006	5.070
502761A	I-287 SB to I-87	NJ Transit RR Tracks/NY Route 59	6/20/2007	6.113
5027612	I-87 NB	NJ Transit RR/NY Route 59	11/30/2006	4.958
502761B	I-87X NB to I-287	NJ Transit RR/87IX – Ramapo River	6/21/2007	5.944
5040109	I-87/I-287	NY Route 202, Wayne Avenue	7/3/2008	4.634
5514129	I-87/I-287	Lake Antrim	7/17/2007	4.825
5514099	I-87/I-287	Spook Rock Road	5/9/2007	4.635
5514071	I-87/I-287 EB	Piermont Rail Line	4/25/2008	4.507
5514072	I-87/I-287 WB	Piermont Rail Line	4/24/2008	4.732
5514439	I-87/I-287	Saddle River Road - CR 73	4/3/2007	4.317
5025629	I-87/I-287	Route 45, Chestnut Ridge Road	7/26/2006	4.603
5514039	I-87/I-287	Pascack Road, Pascack Brook	4/3/2007	4.317
5514019	I-87/I-287	North Middletown Road - CR 33	5/23/2007	5.238
5514009	I-87/I-287	Strawtown Road – CR 23	4/18/2007	5.317
5513999	I-87/I-287	Hackensack River	9/11/2008	5.063
5045399	I-87/I-287	Route 303	5/21/2008	4.547
5027759	I-87/I-287	Route 59	6/19/2008	4.764
The Tappan Zee Bridge carrying I-87/I-287 over River Road, the Hudson River, and Metro-North's Hudson Line is addressed separately in Subchapter D.3.1.				
Westchester County				
5513939	I-87/I-287	Meadow Street	8/8/2007	6.238
5514859	I-87, Interchange 8	SB I-87 Ramp to Route 119/NB Saw Mill River Parkway	3/27/2008	6.635
1037229	I-287	NY Route 119, West Main Street	6/7/2006	6.016
1044579	I-287	Saw Mill River Parkway, Saw Mill River, Vreeland Avenue	8/28/2007	6.155
1006109	I-287	NY Route 9A, North Central Avenue	3/9/2006	7.000
1044619	I-287	Catskill Aqueduct	10/20/2006	6.704
1044629	I-287	Manhattan Avenue	10/25/2006	7.000
1044659	I-287	Bronx River Parkway, Bronx River, Old Kensico Road., Ferris Avenue	8/21/2007	6.042
1044719	I-287	Brockway Place	4/25/2006	4.95
1044779	I-287	Mamaroneck River	4/27/2006	5.024
1044839	I-287	Hutchinson River Parkway	6/28/2007	6.349
1037379	I-287	NY Route120A, EB Westchester Avenue	10/16/2006	4.507
1044869	I-287	Blind Brook	5/3/2006	5.395
1049859	I-287	I-95 Ramps/Metro-North Railroad Tracks	10/10/2007	4.698
1049879	I-287	Midland Avenue CR 72	7/17/2007	4.587
5520030	I-287 Ramp to NB I-95	I-95	11/27/2006	4.375
Shaded ratings of less than 5 indicate deficient conditions				

D.2.4.2.4 I-87/I-287 Mainline - Hydraulics of Bridges and Culverts

In Rockland County, the Thruway crosses over a number of rivers, brooks, creeks, and streams. From west to east these include the Ramapo River, Mahwah River, Antrim Creek, Montebello Creek, a tributary to the West Branch Saddle River, the West Branch Saddle River, the East Branch Saddle River, Hungry Hollow Brook, Pine Brook, Pascack Brook, Naurashaun Brook and the Hackensack River. The crossings of the Ramapo River, Mahwah River, Pascack Brook and Hackensack River are Thruway bridges; the remaining water crossings are in culverts.

Flood Insurance Studies (FIS) using detailed methods have been completed for all major crossings in Rockland County, and detailed or approximate-method studies have been completed for the majority of the minor crossings which currently pass under the Thruway in relatively small culverts. Several updates to current FISs are in progress in Rockland County, but have not been completed, including the Hackensack and West Branch Saddle River. A summary of estimated discharges for 10-, 50-, 100- and 500-year storm events, based on the current FISs, is presented in Table D-18.

Table D-18

Flood Insurance Study Estimated Discharge Rates, Rockland County

Waterbody	FIS	Location of Discharge Estimate	Storm Event Discharge (cfs)			
			10-Yr	50-Yr	100-Yr	500-Yr
Ramapo River	Suffern FIS #0694	At downstream corporate limit of Suffern	5,340	9,785	12,455	20,340
Mahwah River	Suffern FIS #0694	At Thruway	1,370	2,686	3,418	6,161
East Branch Saddle River	Ramapo FIS #5340	Approximately 320 feet downstream of the Thruway	240	250	260	280
West Branch Saddle River	Ramapo FIS #5340	Approximately 120 feet downstream of the Thruway	156	180	194	212
Pine Brook	Chestnut Ridge FIS # 1615	Pine Brook, approximately 100 ft downstream from the Thruway	54	58	63	80
Pascack Brook	Spring Valley FIS #5344	North Branch Pascack Brook, downstream of Route 59	805	1,270	1,525	2,230
Nauraushaun Brook	Clarkstown FIS #0679	Nauraushaun Brook at downstream corporate limit of Clarkstown	480	780	945	1,420
Hackensack River	Clarkstown FIS #0679	At confluence with Lake DeForest	655	1,050	1,290	1,940

Flooding has been a persistent problem in the vicinity of the corridor in Rockland County, and the hydraulic capacity of many of the structures may be inadequate. Specific items noted in the FISs include:

- The Mahwah River is constricted by the Thruway crossing of the river, and results in elevated upstream water levels.

- Substantial increases in the water surface elevation upstream of the Thruway are shown in the Flood Insurance Studies for the Pine Brook, East Branch Saddle River, West Branch Saddle River, and the Nauraushaun Brook, and are indicative of inadequate conveyance.

In addition to the conditions noted in the Flood Insurance Studies, information on recurring flooding issues is being gathered from meetings with local and county government agencies, such as Departments of Public Works, Water Departments, and Drainage Agencies. Specific, recurring flooding issues that are affected by, or could be affected by, changes to Thruway crossings include:

- Major flooding has closed the Thruway at the Hackensack crossing, which was caused by both a lack of clearance and hydraulic capacity at the Hackensack crossing, although downstream structures and upstream dam operations also played a part.

- The neighborhood located on Jeffrey Court, immediately upstream of the Thruway crossing of the Hackensack River, flooded during spring nor'easter 2007. The neighborhood located on Klein Avenue, immediately downstream of the Thruway crossing of the Hackensack River, also flooded during spring nor'easter of 2007, and has also been known to flood at other times.

- Recurring flooding problems exist in the Squires Gate area in Suffern, downstream of the Thruway crossing of the Mahwah River just north of its confluence with the Ramapo River.

Pier/abutment scour protection has been placed at both the Pascack and the Ramapo crossings, although the results of the scour studies/inspections for the crossings have not currently been reviewed.

In Westchester County, the Thruway and CWE crosses, from west to east, a tributary to the Talleyrand Swamp, the Saw Mill River, the Bronx River, the Mamaroneck River and the Blind Brook. As noted previously, the crossings of the Saw Mill River and the Bronx River are highway bridges; the remainder of the crossings is culverts.

FISs have not yet been reviewed for Westchester County crossings; however, discharge rates from nearby United States Geological Survey (USGS) gauging stations are available for some of the waterbodies crossed. The available discharge rates for Westchester County are summarized in Table D-19.

Table D-19

USGS Gauging Station Discharge Rates, Westchester County

Waterbody	USGS Gauging Station	Location	Storm Event Discharge (cfs)			
			10-Yr	50-Yr	100-Yr	500-Yr
Blind Brook at Rye	1300000	Approximately 1 mile downstream of the CWE	1,110	1 460	2,010	3,060
Saw Mill River at Elmsford	137642000	Approximately 1,500 feet downstream of the CWE	570	709	913	1,280
Mamaroneck River at Mamaroneck	1301000	Approximately 4 miles downstream of the CWE	2,190	2,270	3,410	4,510

D.2.4.2.5 I-87/I-287 Mainline - Guide Railing and Median Barriers

The directions of travel on both the Thruway and the CWE are separated by a continuous median barrier comprised of runs in concrete or steel. The rigid concrete segments take several forms, including the Jersey shape, the newer single-slope shape, and asymmetric versions of both (to accommodate differences in elevation). The steel barrier is typically of the corrugated beam type.

Barriers in the form of concrete parapets and steel guide rail are also provided at the edge of the right shoulder at numerous locations along the Thruway and the CWE, at sites that warrant their protection. The specifics and conditions of guide railings and median barriers are documented at one-tenth-of-a-mile intervals for the entire corridor and are included in the *I-87/I-287 Highway Inventory Database*, (September 2006).

D.2.4.2.6 I-87/I-287 Mainline - Utilities

Baseline conditions for public service and utilities information within the 30-mile corridor from Suffern to Port Chester has been collected. Information was obtained for the following utilities: electric, gas, water, sewer, drainage, and telecommunications. The major utilities that were catalogued met the following criteria:

- Electric lines of at least 138 kilovolts (kV).
- Gas lines of at least 12-inch diameter.
- Water transmission mains of at least 16-inch diameter.
- Sewer lines of at least of 20-inch diameter.
- Underground telephone cable ducts.
- Fiber-optic cable.

Many of the utility companies provided information with the understanding that the information would be kept confidential to comply with security requirements. Therefore the data have not been listed here, but are catalogued in a separate baseline utility report (*Public Services and Utilities Baseline Conditions*, (July 2004).

D.2.4.2.7 I-87/I-287 Mainline - Toll Plazas

There are two toll plazas in the Project Area: the Tappan Zee Bridge toll plaza on the Westchester County side of the bridge (MP 13.07), for eastbound traffic, and the Spring Valley Toll plaza located to the west of Interchange 14A (MP 24.31), for westbound commercial vehicles, and passenger vehicles that are towing a trailer.

Spring Valley Toll Plaza

The westbound highway configuration at the Spring Valley Toll Plaza consists of three general-purpose lanes in each direction and a barrier-separated toll plaza with five toll lanes for westbound passenger (tow)/commercial cash customer traffic only. In January 2007 the NYSTA implemented highway speed toll collection at this location that eliminated the need for trucks with E-ZPass to exit the general-purpose lanes to pay the toll in the plaza. Tolls vary depending on vehicle height and number of axles. Cash

paying vehicles over 7'-6" high or with three to seven axles (classes 3L – 7H) pay a west/northbound toll that ranges from $3.00 to $15.75; no toll is collected on southbound trips. Vehicles with E-ZPass pay a reduced toll during certain off-peak hours and on weekends.

Tappan Zee Bridge Toll Plaza

At the Tappan Zee Bridge Toll Plaza, tolls are collected in the eastbound direction only. As part of the recent Interchange 8 reconstruction project the toll plaza was reconstructed to provide the two 35mph Higher Speed E-ZPass lanes. In its current operation all 12 toll plaza lanes are capable of transacting E-ZPass. On typical weekdays eight lanes are assigned for E-Z pass vehicles only, four lanes receive cash and one of these lanes is used for oversized vehicles. Currently the weekday peak period E-ZPass penetration is approximately 90 percent with minimal backups as a result of the highway speed E-ZPass lanes. However, during weekends and specifically high volume summer Sundays, the E-ZPass percentage drops to about 66 percent, and additional lanes are made available for cash transactions.

Similar to the Spring Valley tolling policy, tolls on the bridge vary based on the vehicle class and payment type. Cars (class 2L), with E-ZPass pay $4.75 or $5.00 using cash. The Thruway offers commuter and carpool discounts to E-ZPass account holders. Cash paying vehicles over 7'-6" high or with three to seven axles (classes 3L – 7H) pay a toll that ranges from $11.25 to $47.00. Vehicles with E-ZPass pay a reduced toll during certain off-peak hours and on weekends.

D.2.4.3 I-87/I-287 Intersecting Highways and Roadways

The intersecting highways and other roadway classifications along the corridor include interstates, parkways, arterials, collector roads, local streets and also include shared use facilities. Their functional class, existing cross sections, respective design criteria and identified non-standard features are included in the following subchapters.

D.2.4.3.1 Functional Classification and National Highway System (NHS)

The National Highway System (NHS) roads that intersect the corridor mainline include the Garden State Parkway Connector, the PIP, Route 9W in Rockland County, and the Saw Mill River Parkway, Saw Mill River Road, Sprain Brook Parkway, Bronx River Parkway, and Hutchinson River Parkway in Westchester County. Tables D-20 and D-21 identify the roadways that abut or cross the Thruway and the CWE over the length of the corridor. Their functional class, inclusion in the NHS and designation as a truck route are also indicated.

Table D-20

Functional Classification - Intersecting Highway and Roadways, Rockland County

Roadway	Functional Class	NHS	Qualifying Highway	Access Highway
Garden State Parkway Extension	Other Freeway	Yes	Yes	Yes
Palisades Interstate Parkway	Other Freeway	Yes	No	No
NY Route 59	Other Urban Arterial	No	No	Yes
NY Route 304/S. Main St.	Other Urban Arterial	No	No	No
NY Route 303	Other Urban Arterial	No	No	Yes
US Route 9W/S. Highland Ave.	Other Urban Arterial	Yes	No	No
US Route 9W/Int. 10 Southbound	Other Urban Arterial	Yes	No	No
US Route 9W/Int. 10 Northbound	Other Urban Arterial	Yes	No	No
US Route 202/Wayne Ave.	Minor Urban Arterial	No	No	No
North Airmont Rd. CR 89	Minor Urban Arterial	No	No	No
Spook Rock Rd. CR 85	Minor Urban Arterial	No	No	No
Saddle River Rd. CR 73	Minor Urban Arterial	No	No	No
NY Route 45/Chestnut Ridge Rd.	Minor Urban Arterial	No	No	No
South Pascack Rd. CR35	Minor Urban Arterial	No	No	Yes
North Middletown Rd. CR 33	Minor Urban Arterial	No	No	No
Strawtown Rd. CR 23	Minor Urban Arterial	No	No	No
Hemion Rd. CR 93	Urban Collector	No	No	No
College Rd. CR 81	Urban Collector	No	No	No
Hungry Hollow Rd. CR 71	Urban Collector	No	No	No
Scotland Hill Rd.	Urban Collector	No	No	No
Mountainview Ave.	Urban Collector	No	No	No
South Broadway	Urban Collector	No	No	No
North Palisades Center Dr.	Local Urban Street	No	No	No
Piermont Ave./River Rd. CR 1	Local Urban Street	No	No	No

Table D-21

Functional Classification - Intersecting Highways and Roadways, Westchester County

Roadway	Functional Class	NHS	Qualifying Highway	Access Highway
I-684	Interstate Freeway	Yes	Yes	Yes
I-95	Interstate Freeway	Yes	Yes	Yes
Saw Mill River Parkway	Other Freeway	Yes	No	No
Sprain Brook Parkway	Other Freeway	Yes	No	No
Bronx River Parkway	Other Freeway	Yes	No	No
Hutchinson River Parkway	Other Freeway	Yes	No	No
US Route 9/South Broadway	Other Urban Arterial	Yes	No	Yes
NY Route 119	Other Urban Arterial	No	Yes	Yes*
NY Route 22/N. Broadway CR 87	Other Urban Arterial	No	No	No
Central Westchester Pkwy. CR 150	Other Urban Arterial	No	No	No
US Route 1/Boston Post Rd.	Other Urban Arterial	No	No	No
NY Route 9A/ Saw Mill River Road	Minor Urban Arterial	Yes	Yes	Yes
NY Route 100A/Knollwood Rd.	Minor Urban Arterial	No	No	Yes
NY Route 100/Hillside Ave.	Minor Urban Arterial	No	No	No
Lake St.	Minor Urban Arterial	No	No	No
Westchester Ave. CR62, White Plains	Minor Urban Arterial	No	No	No
White Plains Ave.	Minor Urban Arterial	No	No	No
Anderson Hill Rd. CR18	Minor Urban Arterial	No	No	No
Bryant Ave. CR153	Minor Urban Arterial	No	No	No
Westchester Lane/Corporate Park Dr.	Minor Urban Arterial	No	No	No
NY Route 120/Purchase St.	Minor Urban Arterial	No	No	No
NY Route 120A/Westchester Ave.	Minor Urban Arterial	No	No	No
South Ridge St. CR 54B	Minor Urban Arterial	No	No	No
Midland Ave CR 72	Minor Urban Arterial	No	No	No
Old Kensico Rd.	Urban Collector	No	No	No
Ferris Ave.	Urban Collector	No	No	No
Grant Ave.	Urban Collector	No	No	No
Polly Park Rd. /Bowman Ave. CR 104	Urban Collector	No	No	No
East Meadow St.	Local Urban Street	No	No	No
Vreeland Ave.	Local Urban Street	No	No	No
Winthrop Ave.	Local Urban Street	No	No	No
Manhattan Ave.	Local Urban Street	No	No	No
Hall Ave.	Local Urban Street	No	No	No
Brockway Pl.	Local Urban Street	No	No	No
William L. Butcher Bridge	Local Urban Street	No	No	No
Westchester Ave. Harrison	Local Urban Street	No	No	No
Kenilworth Rd.	Local Urban Street	No	No	No
High St.	Local Urban Street	No	No	No

*Intermittent

D.2.4.3.2 Intersecting Highways and Roadways - Existing Cross Sections

The principal geometric characteristics of the various intersecting roads by classification through the corridor are summarized in Tables D-22 through D-24 and the accompanying schematic sketches.

Table D-22

Cross-Sectional Properties – Intersecting Interstates and Parkways

Roadway	[A] Median	[B] Left Shoulder	[C] Number of Lanes	[D] Right Shoulder	[G] Other
Rockland County					
Garden State Parkway Extension	16’-20’	4’-6’ NB 8’-12’ SB	2+2	8’-16’	Full Access Control
Palisades Interstate Parkway	11’-56’	4’-10’	2+2	4’-10’	Full Access Control
Westchester County					
Saw Mill River Parkway	5’, Guide Rail	Minimal	2+2	No	Access Control
Sprain Brook Parkway	20’ to >200’	Minimal	3+3	0’-10’	Full Access Control
Bronx River Parkway	0 to >200’	None	2+2	No	Access Control
Hutchinson River Parkway	12’-35’	6’	2+2	7’	Full Access Control
I-684	>100’	4’	3+3	10’	Full Access Control
I-95	10’, Barrier	4’	3+3	7’	Full Access Control
Note: Widths exclude short, intermittent discontinuities.					

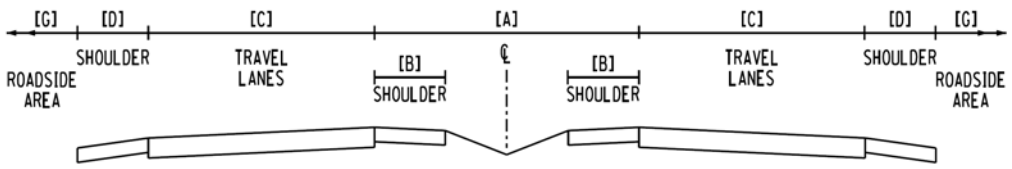


Table D-23

Intersecting Roadway Cross-Sectional Properties - Divided Roads

Roadway	Functional Class	[A] Median	[B] Left Shoulder	[C] Number of Lanes	[D] Right Shoulder	[E] Curb	[F] Sidewalk	[G] Other
Rockland County								
US Route 202, Wayne Ave.	Minor Arterial	0' to 16', raised	Minimal to 6'	1+1 to 2+2	Minimal	Yes	Partial	
CR 89, N. Airmont Rd.	Minor Arterial	32', with turn lanes	Minimal	2+2+ left turn lane	Minimal	West side	No	Guide Rail
US Route 59, Monsey	Arterial	11' striped	No	1+1+ Left turn lane	6'	Yes	No	
Route 59, Nanuet	Arterial	15',varies, raised	No	3+3	Minimal	Yes	Yes	
NY Route 304, S. Main St.	Arterial	16' striped	No	2+2+ left turn lane	10'	Yes	No	
NY Route 303	Arterial	8' striped	No	2+2	Minimal to 8'	Partial	No	Barrier
Route 59, West Nyack	Arterial	0-12' raised	No	2+2	Minimal, varies	Yes	Partial	
US Route 9W, NB (Int. 10)	Arterial	NA	6'	3, varies, One-way	Minimal to 6'	East side	No	Guide rail, trail
Westchester County								
US Route 9, S. Broadway	Arterial	Striped	No	1+1	No	Yes	Yes	
NY Route 119	Arterial	20', raised	Minimal	3+3	No	No	No	Barrier
Central Westchester Pkwy.	Arterial	4', guide rail	No	2+2	11'	No	No	Access control
CR62, Westchester Ave., White Plains	Minor Arterial	NA, split directions	8', varies	2, 2 separate	Minimal to 10'	West side	West side	
Anderson Hill Rd.	Minor Arterial	NA	No	2, One-way	No	Yes	Yes	
Bryant Ave.	Minor Arterial	(6' south, guide rail)	No	1+1+ 2 turn lanes	No	Yes	Yes	
NY Route 120A, Westchester Ave.	Minor Arterial	NA, split directions	6'	2, 2 Separate	5'-7'	No	No	

Note: Widths exclude short, intermittent discontinuities.

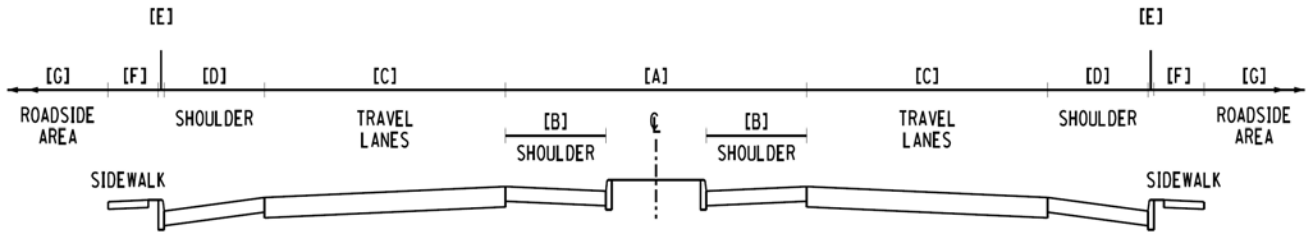


Table D-24

Intersecting Roadway Cross-Sectional Properties - Undivided Roads

Roadway	Functional Class	[C] Number of Lanes	[D] Right Shoulder	[E] Curbs	[F] Sidewalk	[G] Other
Rockland County						
US Route 59, Suffern	Arterial	1+1+ left turn lane	No	Yes	Yes	
CR 93, Hemion Rd.	Collector	1+1	6’	Guide rail	No	Guide rail
CR 85, Spook Rock Rd.	Minor Arterial	1+1	No	South side	Southeast side	
CR 81, College Rd.	Collector	1+1	Minimal	Guide rail, west side	West side	
CR 73, Saddle River Rd.	Minor Arterial	1+1	Minimal	No	No	
CR 71, Hungry Hollow Rd.	Collector	1+1	4’	No	No	Guide rail
NY Route 45, Chestnut Ridge Rd.	Minor Arterial	1+1	6’	No	No	
Scotland Hill Rd.	Collector	1+1	Minimal to 6’	No	No	
CR 35, S. Pascack Rd.	Minor Arterial	1+1, wide	Minimal	No	No	
CR 33, N. Middletown Rd.	Minor Arterial	1+1+ center turn lane	Minimal	Yes	West side	
CR 23, Strawtown Rd.	Minor Arterial	1+1	Minimal	No	No	
N. Palisades Center Dr.	Local Street	2+2	No	No	No	
Mountainview Ave.	Collector	1+1	4’	Yes	Partial, east side	
US Route 9W, S. Highland Ave.	Arterial	1+1, wide	4’	Yes	Yes	
US Route 9W NB (North of Int. 10)	Arterial	1+1	Minimal, varies	West side	West side	
S. Broadway	Collector	1+1	Parking Lanes	East side	East side	
Piermont Ave./River Rd.	Collector	1+1	No	No	No	
Note: Widths exclude short, intermittent discontinuities.						

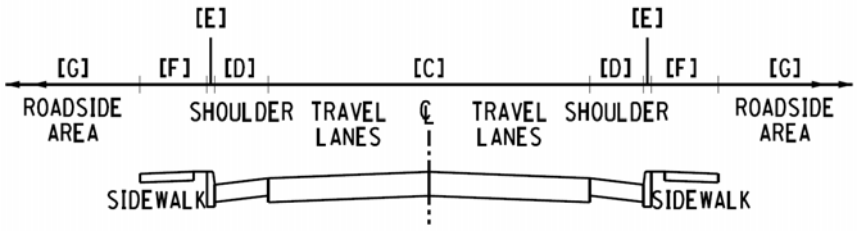
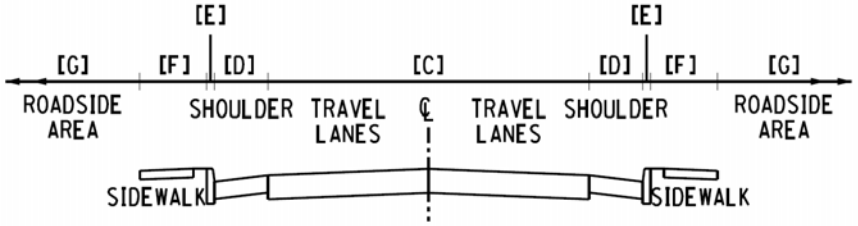


Table D-24 (cont't)

Intersecting Roadway Cross-Sectional Properties - Undivided Roads

Roadway	Functional Class	[C] Number of Lanes	[D] Right Shoulder	[E] Curbs	[F] Sidewalk	[G] Other
Westchester County						
East Meadow St.	Local Street	1+1	No	No	No	
Vreeland Ave.	Local Street	1+1	No	Yes	No	
NY Rte 9A, Saw Mill Riv. Rd./N. Central Ave	Minor Arterial	1+1+ 3 turn lanes	No	Yes	Yes	
Winthrop Ave.	Local Street	1+1	3'	Yes	Yes	
NY Route 100A, Knollwood Rd.	Minor Arterial	2+2	10' right	Yes	Yes	
Manhattan Ave.	Local Street	1+1	No	Yes	Yes	
NY Route 100, Hillside Ave.	Minor Arterial	2+2	No	Yes	Yes	
Old Kensico Rd.	Collector	1+1	No	Yes	No	
Ferris Ave.	Collector	1+1	No	Yes	Partial	
Route 22, N. Broadway	Arterial	2+2+2 turn lanes	0-12' west side	Yes	Yes	
Grant Ave.	Collector	1+1 wide	No	Yes	Yes	
Hall Ave.	Local Street	1+1, wide	No	Yes	Yes	
Lake St.	Minor Arterial	1+1+ turn lane + parking	No	Yes	Yes	
Brockway Pl.	Local Street	1+1	No	Yes	Yes	
White Plains Ave.	Minor Arterial	1+1+ 2 turn lanes	No	Yes	Yes	
William L. Butcher Bridge	Local Street	1+1 + 2 turn lanes	No	Yes	Yes	
Westchester Ln., Corporate Park Dr.	Minor Arterial	1+1+ 2 turn lanes	No	Yes	Yes	
Kenilworth Rd.	Local Street	1+1	No	Yes	Yes	
NY Route 120, Purchase St.	Minor Arterial	1+1	No	Yes	Yes	
Polly Park Rd./Bowman Ave.	Collector	1+1	Minimal east, 6' west side	No	No	
S. Ridge St.	Minor Arterial	2+1+ turn lane	No	Yes	Yes	
High St.	Local Street	1+1	No	Yes	Yes	
US Route 1/Boston Post Rd.	Arterial	2+2	No	Yes	Yes	
Midland Ave	Minor Arterial	1+1 wide	No	Yes	Yes	
Note: Widths exclude short, intermittent discontinuities.						



D.2.4.3.3 Intersecting Roadways - Design Criteria

The design criteria used for the various roadway types that intersect the Thruway and CWE are presented in Tables D-25 and D-26. The design criteria correspond to the 17 critical geometric elements cited in Chapter 2 of the NYSDOT HDM for the individual roadway classifications that include arterials, collector road, local streets and shared use facilities.

D.2.4.3.4 Intersecting Roadways - Non-Standard Features

Investigation of intersecting roadway geometric features has been limited to the immediate vicinity of the corridor, wherein they may affect or be affected by mainline improvement alternatives. Non-standard geometric features among arterials, collectors, and local roads are relatively few and were found in lane widths, shoulder widths, horizontal curvature and stopping sight distance as shown in Tables D-29, D-30 and D-31.

Design speeds for individual roads have been assumed rather than determined from speed studies. In keeping with NYSDOT procedures, the design speed assumed for each road is the highest applicable to its respective functional classification (60 mph for arterials and connectors, 30 mph for local roads), and the suitability of geometric features determined accordingly.

D.2.4.3.5 Intersecting Roadways - Structures Over I-87/I-287

The condition ratings of the structures that cross over the I-87/I-287 mainline including their identification number, facility carried, facility crossed, and inspection date are presented in Table D-32. Bridge inspection ratings are based on the following connotations:

1. Total deteriorated or in a failed condition.
2. Used as a shade between Ratings 1 and 3.
3. Serious deterioration or not functioning as originally designed.
4. Used as a shade between Ratings 3 and 5.
5. Minor deterioration but functioning as originally designed.
6. Used as a shade between Ratings 5 and 7.
7. New Condition. No deterioration.

Ratings below 5 are indicative of the onset of significant deterioration and deemed deficient.

Table D-25

Urban Principal (Other) and Minor Arterials - Geometric Standards

	Element	Standard Criteria	Source
1	Design Speed (mph)	60	HDM §2.7.2.2A
2	Minimum Lane Width (feet) Travel Lane Turning Lane Parking Lane (if Included)	 12 11, 12 Desirable 8, 12 Desirable	HDM §2.7.2.2B,Exhibit 2-4 (Truck Volume > 2%)
3	Minimum Shoulder Width (feet) Left Curbed Divided Uncurbed Divided Right Curbed, for Bicycle Use Uncurbed	 0, 2 Desirable 4 5 8	HDM §2.7.2.2C Exhibits 2-4, 2-3 (ADT > 2000)
4	Minimum Bridge Roadway Width (feet)	Match approach roadway	HDM §2.7.2.2D; BM §2.3.1, Table 2-1
5	Maximum Grade [Rolling]	6%	HDM §2.7.2.2E, Exhibit 2-4
6	Horizontal Curvature, Minimum Radius @e=4% (feet)	1500	HDM §2.7.2.2F, Exhibit 2-4
7	Maximum Superelevation Rate	4%	HDM §2.7.2.2G
8	Minimum Stopping Sight Distance (feet)	570	HDM §2.7.2.2H, Exhibit 2-4
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail	 1.5, 3 at intersections 0	HDM §2.7.2.2I
10	Minimum Vertical Clearance (feet)	14, 14.5 Desirable	HDM §2.7.2.2J; BM §2.4.1, Table 2-2
11	Pavement Cross Slope	1.5% min, 2% max; 1.5% to 5% in parking lane	HDM §2.7.2.2K
12	Maximum Rollover Between Lanes At edge of Traveled Way	 4% 8%	HDM §2.7.2.2L
13	Structural Capacity Rehabilitation* Replacement** Temporary Bridge	HS20, HS25 Desirable HL-93, NYSDOT Design Permit Vehicle HS20	HDM §2.7.2.2M; BM §2.6
16	Pedestrian Accommodation (feet)	5 Highway 5.5 Bridge	HDM §2.7.2.2N; HDM Ch 18; ADAAG

* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement.
Note: All roadways are to be reviewed and a determination made as to whether the roadway is in an urban or rural location, and the proper design criteria applied accordingly.

	Applicable Roads	Rockland County	Westchester County
	Other Arterial	NY Route 59 (FBR) [A] NY Route 304/S. Main St. (FBR) NY Route 303 [A] Route 9W/S. Highland Ave. [N] Route 9W/Interch. 10 S. (BR) [N] Route 9W/Interch. 10 North [N]	US Rte 9/S.Broadway, north of I-287 (FBR) [N,A] US Rte 9/S.Broadway, south of I-287 (FBR) NY Route 119 [A, Intermittent] NY Route 119, I-287 to Main St., WP [N] NY Route 22/N. Broadway (FBR) Central Westchester Pkwy. US Route 1/Boston Post Rd.(FBR)
	Minor Arterial Legend: [N]=National Highway System [Q]=Qualifying Highway [A]=Access Highway (BR)=Bike Route (FBR)=Future Bike route	Route 202/Wayne Ave. (FBR) N. Airmont Rd. Spook Rock Rd. Saddle River Rd. Route 45/Chestnut Ridge Rd. S. Pascack Rd. [A] N. Middletown Rd. Strawtown Rd.	NY Rte 9A/N. Central Ave. north of I-287 [N, A] NY Rte 9A/N. Central Ave. south of I-287 [A] Route 100A/Knollwood Rd. [A] Route 100/Hillside Ave. Lake St. Westchester Ave. White Plains White Plains Ave. Anderson Hill Rd. Bryant Ave. Corporate Park Dr. Route 120/Purchase St. Route 120A/Westchester Ave. S. Ridge St. Midland Ave

Table D-26

Urban Collector Roads - Geometric Standards

	Element	Standard Criteria	Source
1	Design Speed (mph)	60	HDM §2.7.3.2A
2	Minimum Lane Width (feet) Travel Lane Curbed Curbed Industrial Uncurbed Turning Lane Continuous Median Turning Lane Parking Lane (if Included) Residential Commercial, Industrial	 10, 12 Desirable 12 12 11, 12 Desirable 11, 16 Desirable 7, 8 Desirable 8, 11 Desirable	HDM §2.7.3.2B Exhibits 2-6, 2-5 (ADT > 2000) (Truck Volume > 2%)
3	Minimum Shoulder Width (feet) Left Curbed Divided Right Curbed, for Bicycle Use Uncurbed	 0, 2 Desirable 5 8	HDM §2.7.3.2C, Exhibits 2-6, 2-5 (ADT > 2000)
4	Minimum Bridge Roadway Width (feet)	Match approach roadway	HDM §2.7.3.2D; BM §2.3.1 Table 2-1
5	Maximum Grade [Rolling]	7%	HDM §2.7.3.2E, Exhibit 2-6
6	Horizontal Curvature, Minimum Radius @e=4% (feet)	1500	HDM §2.7.3.2F, Exhibit 2-6
7	Maximum Superelevation Rate	4%	HDM §2.7.3.2G
8	Minimum Stopping Sight Distance (feet)	570	HDM §2.7.3.2H, Exhibit 2-6
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail	 1.5, 3 at intersections 0	HDM §2.7.3.2I
10	Minimum Vertical Clearance (feet)	14, 14.5 Desirable	HDM §2.7.3.2J; BM §2.4.1, Table 2-2
11	Pavement Cross Slope	1.5% min, 2% max; 1.5% to 5% parking lane	HDM §2.7.3.2K
12	Maximum Rollover Between Lanes At edge of Traveled Way	 4% 8%	HDM §2.7.3.2L
13	Structural Capacity Rehabilitation* Replacement** Temporary Bridge	HS20, HS25 Desirable HL-93, NYSDOT Design Permit Vehicle HS20	HDM §2.7.3.2M; BM §2.6
16	Pedestrian Accommodation (feet)	5 Highway 5.5 Bridge	HDM §2.7.3.2N; HDM Ch 18, ADAAG

* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement.
Note: All roadways are to be reviewed and a determination made as to whether the roadway is in an urban or rural location, and the proper design criteria applied accordingly.

Applicable Roads	Rockland County	Westchester County
	Hemion Rd. College Rd. Hungry Hollow Rd. Scotland Hill Rd. Mountainview Ave. S. Broadway Piermont Ave./River Rd.	Old Kensico Rd. Ferris Ave. Grant Ave. Polly Park Rd./Bowman Ave.

Table D-27

Local Urban Roads and Streets - Geometric Standards

	Element	Standard Criteria	Source
1	Design Speed (mph)	30	HDM §2.7.4.2A
2	Minimum Lane Width (feet) Travel Lane Curbed Curbed Industrial Uncurbed Turning Lane Parking Lane (if Included) Residential Commercial, Industrial	 10, 11 Desirable 12 12 9, 10 Desirable ≤ 2% Trucks 9, 12 Desirable > 2% Trucks 7, 8 Desirable 8, 11 Desirable	HDM §2.7.4.2B, Exhibit 2-8, 2-7 (ADT > 2000)
3	Minimum Shoulder Width (feet) Left Curbed Divided Right Curbed, Bicycle Route Uncurbed	 0, 2 Desirable 5 8	HDM §2.7.4.2C, Exhibits 2-8, 2-7 (ADT > 2000)
4	Minimum Bridge Roadway Width (feet)	Match approach roadway	HDM §2.7.4.2D; BM §2.3.1, Table 2-1
5	Maximum Grade [Rolling] - Residential Commercial & Industrial	 15% 8%	HDM §2.7.4.2E, Exhibit 2-8
6	Horizontal Curvature, Minimum Radius @e=4% (feet)	250	HDM §2.7.4.2F, Exhibit 2-8
7	Maximum Superelevation Rate	4%	HDM §2.7.4.2G
8	Minimum Stopping Sight Distance (feet)	200	HDM §2.7.4.1H, Exhibit 2-8
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail	 1.5, 3 at intersections 0	HDM §2.7.4.2I
10	Minimum Vertical Clearance (feet)	14, 14.5 Desirable	HDM §2.7.4.2J; BM §2.4.1, Table 2-2
11	Pavement Cross Slope	1.5% min; 2% max 1.5% to 5% parking lanes	HDM §2.7.4.2K
12	Maximum Rollover- Between Lanes At edge of Traveled Way	 4% 8%	HDM §2.7.4.2L
13	Structural Capacity Rehabilitation* Replacement** Temporary Bridge	HS20, HS25 Desirable HL-93, NYSDOT Design Permit Vehicle HS20	HDM §2.7.3.2M; BM §2.6
16	Pedestrian Accommodation (feet)	5 Highway 5.5 Bridge	HDM §2.7.4.2N, HDM Chapter 18; ADAAG

* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement

. Note: All roadways are to be reviewed and a determination made as to whether the roadway is in an urban or rural location, and the proper design criteria applied accordingly.

Applicable Roads	Rockland County	Westchester County
	N. Palisades Center Dr.	East Meadow St. Vreeland Ave. Winthrop Ave. Manhattan Ave. Hall Ave. Brockway Pl. William L. Butcher Bridge Kenilworth Rd. High St.

Table D-28

Shared-Use Facilities (Two-Way Path) - Geometric Standards

Element		Indicative Criteria	Source
1	Design Speed (mph)	20	HDM Chapter 17; AASHTO Bicycle Facilities Guide
2	Minimum Lane Width (feet)	10	HDM Chapter 17; AASHTO Bicycle Facilities Guide
3	Minimum Shoulder Width (feet)	2 (Unpaved), 3 Desirable	AASHTO Bicycle Facilities Guide
4	Minimum Bridge Width (feet)	Paved path width + 2 each side	AASHTO Bicycle Facilities Guide
5	Maximum Grade	5% (Continuous) ^	HDM Chapter 17; AASHTO Bicycle Facilities Guide
6	Horizontal Curvature, Minimum Radius, E=2%, 20°Lean Angle (feet)	90	HDM Chapter 17; AASHTO Bicycle Facilities Guide, Tables 1 & 2
7	Maximum Superelevation Rate	3%	AASHTO Bicycle Facilities Guide
8	Minimum Stopping Sight Distance (feet)	140 Longer for downhills > 5%	AASHTO Bicycle Facilities Guide, Fig. 19
9	Minimum Horizontal Clearance (feet)	3 5 at hazards and side slopes > 33%	HDM Chapter 17; AASHTO Bicycle Facilities Guide
10	Minimum Vertical Clearance (feet)	8 10 at underpasses Maint. vehicles, as needed > 10	HDM Chapter 17; AASHTO Bicycle Facilities Guide
11	Pavement Cross Slope	2%	HDM Chapter 18; ADAAG
12	Maximum Rollover	4%	-
13	Structural Capacity	H10	NYSDOT BM §2.6.4
14	Minimum Level of Service (Pedestrian)	B	HDM §18.5.4, Exhibit 18-2
15	Control of Access	Maintain separation from roads	AASHTO Bicycle Facilities Guide
16	Pedestrian Accommodation	Per ADAAG	ADAAG; AASHTO Bicycle Facilities Guide

^ Grades between 5% and 11+% are permissible for short lengths varying from 800 feet to 50 feet, as prescribed in the AASHTO Bicycle Facilities Guide.

Note: Where applicable, a determination made as to whether the pertinent roadway is in an urban or rural location, and the proper design criteria applied accordingly.

Table D-29

Non-Standard Geometric Features - Arterials

Element		Criteria	Rockland County Arterials with Non-Standard Features	Westchester County Arterials with Non-Standard Features
2	Min. Lane Width (ft) Travel Lane	12’	North Airmont Road [NB/EB: 2@10’], Route 303 [2@11’]	Route 9, South Broadway [4@10-11’], Route 9A, North Central Avenue [3@11’]
	Turning Lane	11’		Route 9, S. Broadway [NB: 1@10’], Route 9A, N. Central Avenue [2@10’]
	Parking Lane (if Included)	8’		Lake Street [2@7.2’]
3	Min. Shoulder Width (ft) Right, Curbed, Bicycle Rte. Right, Uncurbed	 5’ 8’	Strawtown Road [0-4’]	Westchester Avenue West [6-8’]
6	Min. Radius (ft)	1500’	Spook Rock Road [550’]	Anderson Hill Road [350’ (south), 750’ (north)] Route 120, Purchase Street [265’] Route 120A, Westchester Avenue [900’]
8	Min. Stopping Sight Distance (ft)	570’		Anderson Hill Road [350’] Route 120, Purchase Street [300’] Route 120A, Westchester Ave.[500’] Route 22/N. Broadway [475’] Lake Street [145’] Westchester Avenue [400’]

Table D-30

Non-Standard Geometric Features - Urban Collector Roads

Element		Criteria	Rockland County Collectors with Non-Standard Features	Westchester County Collector with Non-Standard Features
2	Min. Lane Width (ft) Travel Lane, Uncurbed	12’	Hungry Hollow Rd. [10-11’]	
6	Min. Radius (ft)	1500’		Polly Park Road./Bowman Avenue [330’]
8	Min. Stopping Sight Dist. (ft)	570’		Grant Avenue [560’]

Table D-31

Non-Standard Geometric Features - Local Urban Roads

	Element	Criteria	Rockland County Local Roads with Non-Standard Features	Westchester County Local Roads with Non-Standard Features
2	Min. Lane Width (ft) Travel Lane, Uncurbed	12’		East Meadow Street [10’]

Table D-32
Condition Ratings of Bridges over I-87/I-287 Mainline

Bridge ID Number	Carried	Crossed	Inspection Date	Condition Rating
Rockland County				
5523950	I-287 NB Ramp to NB I-87	I-87	9/25/2008	5.479
5523960	I-87/I-287 WB Ramp to SB I-287	I-87/Ramapo River	4/28/2008	5.859
5514110	Hemion Road CR 93	I-87/I-287	3/26/2008	4.688
5514100	Airmont Road EB	I-87/I-287	9/6/2007	4.219
551410A	Airmont Road SB	I-87/I-287	9/6/2007	6.458
5514080	College Road CR 81	I-87/I-287	5/27/2008	3.922
1027640	NY Route 59	I-87/I-287	5/27/2008	4.141
5514060	Hungry Hollow Road CR 71	I-87/I-287	7/29/2008	4.281
5514050	Scotland Hill Road	I-87/I-287/EB Exit Ramp	7/12/2007	3.984
5514049	Garden State Parkway	I-87/I-287	4/10/2007	4.366
1027689	NY Route 59	I-87/I-287	10/17/2007	5.861
7712160	NJ Transit Pascack Line	I-87/I-287	10/4/2006	5.032
1045400	NY Route 304	I-87/I-287	7/18/2008	4.125
1068691	Palisades Interstate Parkway SB	I-87/I-287	10/15/2008	6.451
1068692	Palisades Interstate Parkway NB	I-87/I-287	10/15/2008	6.451
7712110	CSX Railroad Tracks	I-87/I-287	10/5/2006	4.955
2269160	Palisades Center Drive	I-87/I-287	9/13/2006	6.627
5513970	Mountainview Avenue	I-87/I-287	9/8/2008	3.641
1007100	US Route 9W, Highland Avenue	I-87/I-287	5/24/2006	4.694
1007090	US Route 9W Connector	I-87/I-287	6/5/2008	5.278
5513969	Interchange 10 Loop Ramps	I-87/I-287	5/3/2007	6.014
5513950	I-887/I-287 Int. 10 Exit Ramp	I-87/I-287 Int. 10 Entrance Ramp	6/6/2007	5.635
1007080	US Route 9W NB	I-87/I-287	5/3/2007	5.083
5513940	Broadway	I-87/I-287	5/3/2007	4.736
Westchester County				
1004939	US Route 9, South Broadway	I-87/I-287	10/15/2007	6.485
5524710	I-87 NB	I-287 EB Interchange 8	9/27/2007	6.175
1077920	WB I-287 Ramp to SB I-87	I-287 Interchange 8	11/20/2007	6.676
5514840	WB I-287 Ramp to SB I-87	I-87 Interchange 8	9/26/2007	6.492
1077910	NB I-87 Ramp to EB I-287	SB I-87 Ramp to Rte. 119/NB Saw Mill	10/31/2007	6.302
1044590	Winthrop Avenue	I-287	10/27/2006	7.000
5053210	Sprain Brook Parkway SB	I-287	10/27/2006	6.887
5053200	Sprain Brook Parkway NB	I-287	10/27/2006	6.930
1044600	NY Route 100A , Knollwood Road	I-287	10/22/2007	6.882
1044630	NY Route 100, Hillside Avenue	I-287	10/4/2007	6.250
1044640	WB NY Route 119 Ramp to WB I-287	I-287	10/4/2007	6.672
1016540	NY Route 22, N. Broadway CR 87	I-287	10/26/2007	3.833
1044660	Grant Avenue	I-287	10/9/2007	3.688
1044670	Central Westchester Parkway Ramp	I-287	10/26/2006	4.069

Table D-32 (con't)

Condition Ratings of Bridges over I-87/I-287 Mainline

Bridge ID Number	Carried	Crossed	Inspection Date	Condition Rating
Westchester County (con't)				
1044680	Hall Avenue	I-287	10/18/2006	3.778
1044690	Lake Street	I-287	10/18/2006	3.917
1044700	NY Route 119 Ramp to WB I-287	I-287	10/24/2007	4.234
1044560	NY Route 119 Ramp to WB I-287	Westchester Avenue	Not yet recorded	Not yet recorded
1044720	WB I-287 Ramp to NY Route 119	Westchester Avenue	8/27/2007	3.984
1044740	NY Route 119 Ramp, Westchester Avenue CR 62	I-287	10/17/2006	3.75
1044750	NY Route 127, White Plains Avenue	I-287	10/24/2006	3.875
1044760	Anderson Hill Road CR 18	I-287	10/24/2006	4.438
1044780	WM. L. Butcher Bridge	I-287	10/25/2006	4.156
1052880	WB I-287 Ramp to I-684 NB	I-287	9/4/2007	5.000
1052900	SB I-684 Ramp to I-287 EB	I-287	5/22/2006	4.625
1044810	Bryant Avenue CR 153	I-287	11/27/2006	4.516
1044820	Corporate Park Drive	I-287	11/27/2006	4.156
1044840	Kenilworth Road	I-287	8/21/2008	4.875
1037330	Route 120, Purchase	I-287	8/21/2008	4.903
1044850	Bowman Avenue CR 104	I-287	11/28/2006	5.094
1044870	South Ridge Street CR 54B	I-287	11/7/2006	4.938
1044880	High Street	I-287	11/15/2006	5.125
1000090	US Route 1, Boston Post Road	I-287	10/25/2007	4.641
Shaded ratings of less than 5 indicate deficient conditions				

D.2.5 Landscape and Environmental Enhancement Opportunities

In crossing Rockland and Westchester Counties, the 30-mile corridor traverses a rolling landscape, largely within a suburban context of low-density residences. Exceptions include older villages, such as Suffern and Port Chester, Hudson River towns (e.g., Nyack and Tarrytown), and the urban center of White Plains. There are no scenic overlooks and few locations that provide extensive vistas or panoramas, primarily because of the naturally wooded landscape that channels the highway. The major exception is the crossing of the Hudson River at one of its widest points and with dramatic views of the Palisades cliffs on the Rockland County shore from the Tappan Zee Bridge.

In Rockland County, the 250-foot ROW provides for a naturally wooded buffer along its margins for much of its length, although noise barriers are also to be found where residences are close to the ROW. There are few important natural landmarks adjacent to the highway, with the exception of the Palisades Interstate Park (Harriman State Park) in Suffern, and Mountainview Nature Park in Clarkstown. In several places (e.g., west of College Road), cuts for the highway present rock ledges, some of which reveal interestingly eroded red sandstone. There are multiple bridges over the highway that will need reconstruction during project construction, and these may present an opportunity to provide a more unifying design theme for Rockland County.

The primary landscape feature of the corridor is the Hudson River and its wide expanse at the Tappan Zee, crossed by the bridge from South Nyack to Tarrytown, and presenting views of the cliffs of the Palisades escarpment on the Rockland County shore. These views may become more accessible by way of the proposed pedestrian and bicycle ways on the replacement Tappan Zee Bridge.

In Westchester County, west of White Plains the highway is typically in its more urban context, with noise barriers and massive infrastructure elements associated with interchanges and ramps. The highway skirts north of the City of White Plains in its most urban context but, east of the city, it opens to provide for wide service roads on either side and with a landscaped median between the service roads and the highway. This is also the area of the Platinum Mile of office parks that complement the rolling landscape with their own landscaped facilities. Preservation and enhancement of this "park-boulevard" appearance should be considered, including several rock outcrops that provide visual interest. Farther east, the highway corridor narrows, without the service roads, and squeezes in a rock cut between Abendroth Park and St. Mary's Cemetery before joining with I-95 in Port Chester. The corridor continues north into downtown Port Chester alongside the New Haven Line rail tracks in a mostly commercial corridor.

In addition to the opportunities to preserve and enhance the landscape already noted, there are several trails that cross the highway and several more that are proposed (Subchapter 2.3.2). Such trails should be fully incorporated into the design of the highway and bridge improvements. The reconstructed Tappan Zee Bridge landings may also present opportunities for enhancement at River Road in South Nyack, including the widened bridge and possibly with a pocket park and boat launch at the river.

D.3 Tappan Zee Bridge - Existing Conditions and Deficiencies

The Tappan Zee Bridge is located approximately 25 miles north of the Statue of Liberty in New York City, crossing the Hudson River between Tarrytown and South Nyack. The bridge was designed by Madigan & Highland and built by the American Bridge Company. It has an overall length of approximately 3 miles and is comprised of 197 spans that for analysis purposes are subdivided into five segments based on location and structure types, as shown in Figure D-8.

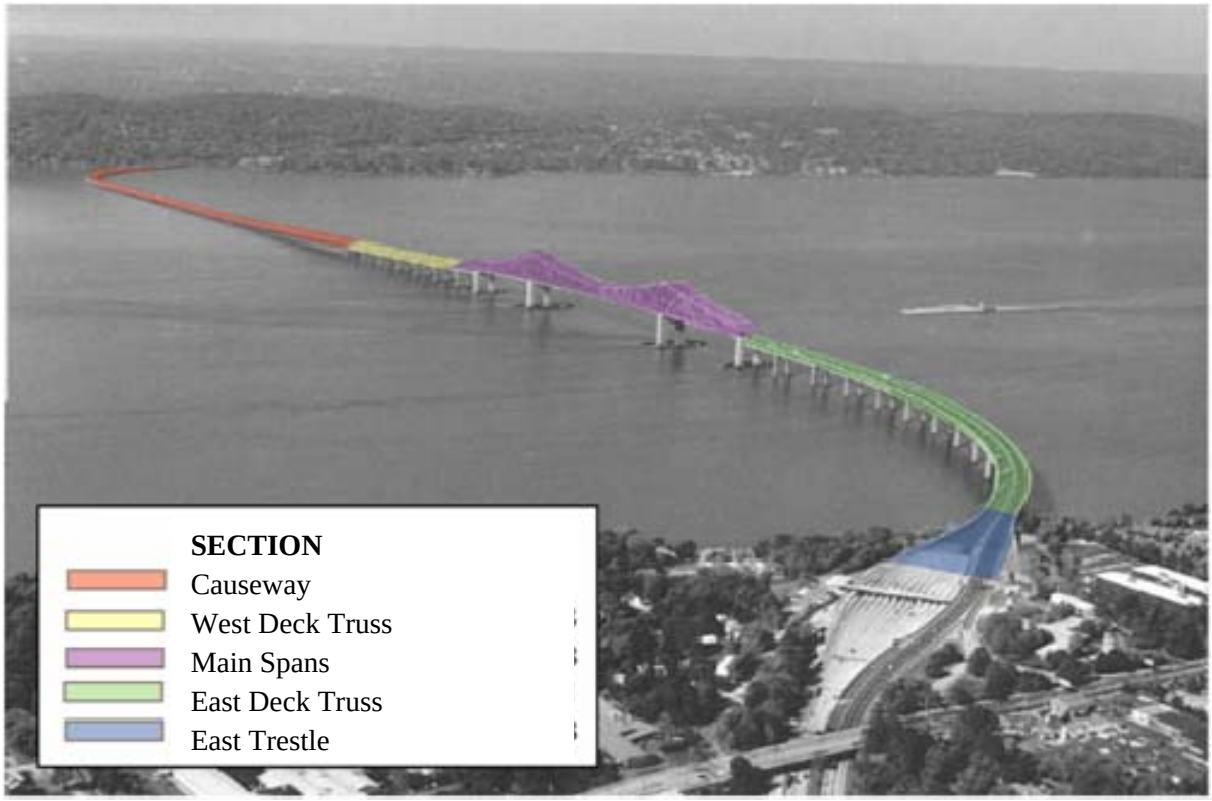


Figure D-8 Tappan Zee Bridge from the East

In the course of the inspection and investigation of the bridge, the NYSTA has made available originals of all reports, studies, inspections and repair contracts conducted on the bridge since its construction. These documents are extensive, encompassing approximately 100 volumes or binders. Within these volumes are the records of 11 extensive inspections of the bridge dating from 1979 to 2000, and approximately 40 repair contracts, dating from 1960 to 2002.

D.3.1 Existing Conditions

The Tappan Zee Bridge is comprised of five segments – the causeway, west deck truss, main spans, east deck truss and east trestles. Completed in 1955, the bridge was designed and built to a budget utilizing economical and readily available bridge components. Although long term maintenance was undoubtedly considered in the original design, many of the selected components and details are not conducive to long term durability:

- The bridge was designed to be light, with thin decks, to reduce weight and thus avoid the need for deep foundations in the poor soil conditions of the river. The thin decks sacrifice durability.

- The bridge was designed to be flexible, with deck joints between each of the almost 200 spans, to allow for differential settlements of the shallow causeway foundations in the soft riverbed soils. The joints allow de-icing salts to leak onto the substructure components and have proven to be a major source of deterioration.

- The bridge was designed with open drains. This provided a path for the deposition of de-icing salts onto substructure components, resulting in extensive corrosion of primary, secondary and tertiary steel members.

- Open steelwork sections were used in the trusses, with holes to reduce weight and save steel costs. This allows salts to penetrate into the adjoining connections, resulting in corrosion and posing repair challenges due to the inherent difficulties in reaching parts within intricate joints.

- The number of individual pieces on the bridge exceeds 100,000, making it difficult to monitor and repair and replace individual parts within elaborate assemblies.

Where possible, these design features are being systematically modified by the NYSTA as part of the repair contracts. However, some elements cannot be modified to meet current standards.

In the mid 1980s notable deterioration of the bridge was first recorded, prompting the beginning of an extensive repair program by the NYSTA. Since then, targeted repairs were made to all segments and components of the bridge including the concrete deck, primary, secondary and tertiary steelwork, stringers, bearings, pier bents, columns, pile caps, and piles for ice breakers and ship protection. These staged repairs are still underway today and include the current causeway partial deck replacement program, a $150 million two-year repair contract.

Several other Tappan Zee Bridge characteristics are relevant to the bridge's integrity and operation:

- The structure does not comply with current bridge code requirements for strength and extreme events including wind and seismicity.

- The bridge is vulnerable to earthquakes because of its foundations, structural configuration, and seismic amplification that can occur through the deep soft soils under the Hudson River.

- The structure lacks redundancy (duplication of critical components of a structure). Given the critical regional value of the crossing, the risks associated with possible deliberate actions are not acceptable.

- The bridge has a higher rate of highway accidents than the rest of the Thruway system due to its constrained and variable geometry and configuration.

- While all repairs are scheduled outside of peak hours, the windows of time available for maintenance and repair are constantly being reduced due to increasing traffic. Most major repairs need to occur at night. Unscheduled repairs disrupt traffic and result in increased costs

D.3.2 Deficiencies

Through the mid 1990s, the continuous repairs by the NYSTA were sufficient to preserve the overall condition of the Tappan Zee Bridge. However, in more recent years the overall condition of the bridge is again in decline. The effects of age, truck volumes and highway and marine salts are causing the deterioration of the bridge, with the scale and rate of deterioration amplified relative to other major bridges because of its unique structural form and detailing.

The following reports document the activities completed in establishing the condition, limitations and vulnerability of the existing Tappan Zee Bridge:

- *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009)

- *Existing Conditions Report* (September 2008)
  - 2002 Biennial Inspection
  - In-depth bridge inspection completed March 2003
  - Biennial bridge inspection completed in December 2004
  - Fathometric survey
  - Underwater inspection of foundations
  - Ground Penetrating Radar (GPR) survey of the bridge deck
  - Ultrasonic testing of primary pins on the main truss
  - Miscellaneous concrete testing
  - Miscellaneous steel testing
  - Assessment of historical rates of deterioration

- *Geotechnical Data Report* (June 2007)
  - Geotechnical Investigation including seven new boreholes

- *Structural Assessment Report (*September 2008)
  - Load rating at inventory and operating levels
  - Wind analysis

- Risk Assessment (See Appendix B of the *Alternatives Analysis for Rehabilitation and Replacement of the Tappan Zee Bridge* (March 2009))
  - Vulnerability assessment in accordance with the NYSDOT manuals
  - Threat and Risk Assessment (TARA)

- *Seismic Assessment Report* (September 2008)
  - Multi-modal seismic analysis
  - Time-history seismic analysis
  - Probabilistic Site Hazard Assessment (PSHA)

The overall assessment of the Tappan Zee Bridge indicates that it is safe for continued traffic use with all primary and secondary structural components in good working condition. Tertiary components (such as fascia), particularly on the edge of the deck, were in poor condition with extensive deterioration.

NYSDOT rates its bridges on a scale from 1 to 7, with 7 being the rating of a bridge in new condition and ratings less than 5 indicating the onset of deterioration. Inspection of the bridge (carried out by NYSTA in 2006) resulted in an overall condition rating of 2.96 indicating substantial ongoing deterioration.

The rate of deterioration of the bridge is unusually high and is a consequence of the de-icing salts used on the concrete deck falling onto components below. Of the approximate 2,600 conditions requiring attention, found in the inspections conducted, 93% were associated with water and de-icing salts penetrating below the concrete deck.

Investigation and inspection of the deck concrete indicates widespread severe deterioration and overall poor condition. A total of 45 punch-through deck failures were recorded on the bridge deck during an 18 month period, 44 of which were in the truck carrying outer two lanes. It is estimated that 59% of the

original deck area will need to be replaced in the next 10-15 years. NYSTA current repair program includes deck and stringer replacement and other reconstruction on the outside lanes of the bridge.

D.3.3 Vulnerabilities

The Tappan Zee Bridge has five ratings that warrant inclusion in NYSDOT's safety program based on the Bridge Safety Assurance vulnerability manuals. These are: seismic, overload, vehicle collision, vessel collision, and steel details. They have the potential to result in major damage, which implies a loss of functionality for an extended period of time, and minor damage, which implies a partial or shorter term loss of functionality.

- Seismic

  The existing bridge does not meet the current performance standards for a critical bridge. The extent of repair work required on the bridge would likely require closure of the bridge for a substantial period. Major damage to various segments of the bridge is possible.

  Soil conditions at the Tappan Zee Bridge, and particularly under the causeway, amplify the magnitude of a seismic event by factors ranging from 4 to 6. This results in horizontal forces on the various segments equivalent to up to 50% of gravity, which are significantly above the standard horizontal design forces of 10-15% typically used for bridges not designed to contemporary seismic requirements.

- Load

  The bridge can adequately support the originally intended design live load, the equivalent of modern HS-20 truck. Current NYSDOT design standards call for a heavier, more conservative loading (HL-93). Strengthening to support HL-93 highway loading and the NYS Design Permit Truck is warranted given the status of I-87/287 as a primary NHS Truck Route and the national trend towards heavier trucks. Initial analysis indicates that 35% of stringers and all the floor beams in the Deck Trusses and cap beams in the causeway would require strengthening to accommodate the increased live load parameter. The NYSTA current program of deck and stringer replacement will increase the capacity of the replaced components to HS-25, which will generally satisfy the requirements of HL-93.

- Vehicular Impact

  Analyses of the possible sources, locations, and potential consequences of vehicular impacts to the bridge identified the following risks:

  - Impact of vehicles on roadside piers may be sufficient to cause local damage.
  - Impact by vehicles on local members of the truss may be sufficient to cause major damage.

- Vessel Impact

  Analyses of the possible sources, locations, and potential consequences of impacts to the bridge by river borne vessels identified the following risks:

  - Impact of ships on piers other than the main towers may be sufficient to cause major damage.

- Impact of barges on piers other than the main towers may be sufficient to cause major damage.
- Impact of ships on the superstructure may be sufficient to cause major damage.

- Steel Details

  Analyses of the bridge structural elements and joints identified the following issues:

  - The presence of many individual members on the bridge, which if damaged or deteriorated, could result in local or major damage of portions of the bridge represents a major risk. Only small forces applied to key members of the deck trusses or main spans could cause disproportionate consequences. Redundancy is non-existent.

  - Metal fatigue particularly at flange plate details in the trestle stringers could result in local damage.

  - Material toughness properties for the carbon and silicon steel imply possible failure and consequent local or major damage.

  - The history of deterioration of steel members, particularly from open drains and joints, implies possible major damage.

D.3.4 Tappan Zee Bridge Design Criteria

Similar to the design philosophy of the *AASHTO LRFD Bridge Design Specifications,* the DEIS replacement bridge options will be designed for specified limit states to achieve objectives of constructability, safety, and serviceability with due regard to issues of inspectability, economy and aesthetics commensurate with such a critical structure. The following statements outline the general design philosophy:

- Service Limit State - The service limit state shall be taken as restrictions on stress, deformation, and crack width under regular service conditions. To minimize roadway closures for maintenance, all components, including materials, forms and details, must consider life-cycle maintenance requirements. Where possible and economically justified all components should be designed to avoid major maintenance for 100-years.

- Fatigue and Fracture Limit State - The fatigue limit state shall be taken as restrictions on the stress range of a single design truck occurring at the number of expected stress range cycles. The fracture limit state shall be taken as a set of material toughness requirements of the AASHTO Material Specifications.

- Strength Limit State - Strength limit state shall be taken to ensure that strength and stability, both local and global, are provided to resist the specified statistically significant load combinations that a bridge is expected to experience in its design lifetime.

- Extreme Natural Event Limit State - The extreme natural limit state shall be taken to ensure the structural survival of the bridge during a major earthquake or flood, when collided by a vehicle, vessel or ice flow possibly under scour conditions.

- Extraordinary Event Limit State - The extraordinary event limit state shall be taken to ensure the structural survival of the bridge during major events resulting from malicious intent.

- Ductility - The structural system shall be apportioned and detailed to ensure the development of significant and visible inelastic deformation at the strength, the extreme, and the extraordinary limit states before failure.

- Redundancy - Continuous structures and multiple load paths shall be used unless there are compelling reasons not to use them.

- Operational Importance - The Tappan Zee Bridge is categorized as a critical structure in the regions infrastructure. As part of the corridor the bridge is part of a national strategic route.

- Life Span - The bridge shall be designed for a life span of at least 150 years.

- Loading: The bridge shall be designed for the standard loading and load combinations in accordance with *AASHTO LRFD Bridge Design Specifications* (including, live, impact, centrifugal, braking, collision, other accidental loading, dead (gravity), supplemental dead, hydraulic, wind, thermal, seismic, water, ice, deformation, settlement and earth pressures) as well as the following specific provisions:

    - Layout - The Tappan Zee Bridge shall support a highway consisting of four general use lanes, one BRT lane and a full complement of shoulders in each direction, arranged as called for by the bridge replacement alternatives. If the preferred alternative includes rail, the bridge shall also support two rail.

    - Highway loading - Load factors shall be modified to account for the 150 year design life. Specific live loading shall be developed based on the extended life span and specific truck volumes using past and projected traffic volumes.

    - Railroad Loading - Rail loading will be in accordance with AREMA (8.2.2.3c, 15.1.3.3a). Rail freight loading shall be based on Cooper E80 with 315,000 lbs GRL and 80,000 lbs maximum pending further assessment as part of the DEIS. Commuter rail loading will be based on the existing and future Metro-North rolling stock, yet to be established.

    - Wind Loads - The bridge shall be designed for a site specific wind profile determined from wind speeds recorded at the bridge and adjacent monitoring stations. Design forces shall account for the increase in wind speed with height.

    - Seismic Loads - The bridge shall be designed for site specific seismic demands determined from the 2008 Probabilistic Seismic Hazard Assessment.

- Load Combinations - Load factors shall be modified based on a risk assessment to account for the 150 year design life span and to comply with redundancy and importance classification requirements.

The design criteria related to the highway and railroad elements of the DEIS replacement bridge options are included in Tables D-33 and D-34. The highway design criteria correspond to the 17 critical geometric elements cited in Chapter 2 of the NYSDOT HDM for interstate highways. The railroad design criteria correspond to the requirements of various jurisdictional associations and agencies including AREMA, Metro-North, NFPA, and NYS Railroad law.

D.4 Existing Transit Services in the Corridor

D.4.1 Existing Bus Service

There are existing bus networks throughout the corridor, including both the *Bee-Line* (Westchester County) and Transit of Rockland (TOR) local buses, and express buses to Manhattan. These buses are either operated by the county or by private bus companies under contract to the county. The *Bee-Line* service is well established and has a historic market role. The TOR service covers an area experiencing more change, and is still responding to growth.

- **I-87/I-287 Corridor Bus Routes,** TOR operates the Tappan Zee Express (TZX) buses from Rockland County across the Tappan Zee Bridge to the Metro-North Tarrytown Station and to the White Plains Transportation Center with peak-period headways of 10 to 15 minutes. The TZX buses serve the Park-and-Ride facility at the Palisades Center Mall, and many buses serve Suffern, Spring Valley, with stops along Route 59, and Nyack. Service is either to the Tarrytown Metro-North Station or the White Plains Transportation Center. Additional bus lines operate in the corridor, including the Orange-Westchester Link (OWL) service, Adirondack Trailways, Coach USA/Shortline, and Monsey Trails & Monroe Bus. Based on the surveys conducted for this study, most of the passengers on the TZX buses are commuters connecting to Metro-North for direct commuter rail service to Grand Central Terminal (GCT). The Westchester County Bee-Line operates approximately 16 buses service corridor in Westchester.

- **Other County Bus Routes.** The other bus routes that directly affect this corridor are the routes on parallel roads (i.e., Route 59, Route 119, Westchester Avenue) and those on major north-south arterials feeding the corridor (e.g., Route 303, Route 306, Route 100, Route 22, etc.).

    - **Rockland County:** In addition to the TZX, TOR operates seven routes plus three Money Loops and a Ferry Express. In addition Clarkstown operates five (5) shuttle buses (Mimi-Trans) that seat 22 passengers.

    - **Westchester County:** The *Bee-Line* system operates a total of 66 routes. There are 36 local routes, three (3) summer service routes, and nine (9) routes for each of the following: Bus to Rail, Express/Limited Stops, and Shuttle Service.

Table D-33

Tappan Zee Bridge - Highway Geometric Design Criteria

	Critical Design Element	Standard Criteria	Source
1	Design Speed (mph)	70	HDM §2.7.1.1A; NYSTA
2	Minimum Lane Width (feet)	12	HDM §2.7.1.1B
3	Minimum Shoulder Width (feet) Left Right	 4, 12 Desirable 10, 12 Desirable	HDM §2.7.1.1C, Exhibit 2-2; NYSTA
4	Min. Bridge Roadway Width (feet)	Match approach highway	BM §2.3.1 Table 2-1
5	Maximum Grade	3%	NYSTA
6	Horizontal Curvature, Minimum Radius @e=6% (feet)	2040	HDM §2.7.1.1F, Exhibit 2-2;
7	Maximum Super-elevation Rate	6%	HDM §2.7.1.1G
8	Min. Stopping Sight Distance (feet)	730	HDM §2.7.1.1H, Exhibit 2-2
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail	 15 Shoulder width (not less than 4)	HDM §2.7.1.1I
10	Minimum Vertical Clearance (feet) Vehicular Bridges Pedestrian Bridges OH Sign Structures & Signs	 14^, 16.5 Desirable^ 17, 17.5 Desirable^^ 17, 17.5 Desirable^^	HDM §2.7.1.1J BM §2.4.1, Table 2-2;
11	Pavement Cross Slope	1.5% min 2% max	HDM §2.7.1.1K
12	Maximum Rollover Between Lanes At edge of Traveled Way	 4% 8%	HDM §2.7.1.1L
13	Structural Capacity	HL-93, NYSDOT Design Permit Vehicle, additional long-span criteria based on bridge type	AASHTO LFRD §1.1, §3.6 HDM §2.7.1.1M BM §2.6
14	Minimum Level of Service	C, D with supporting documentation	HDM §2.6.14, §2.7.1.1N, Heavily Dev Urban Area
15	Control of Access	Full	HDM §2.7.1O
16	Pedestrian Accommodation	Prohibited, under legal review	21 NYCRR, Chapter 3A, §102.1; NYS Highway Law, Article 1, §3.2
17	Minimum Median Width	10	HDM §2.7.1.1P
Additional River Criteria			
18	Minimum Clearance Over Shipping Channel (feet)	139 at Existing Piers, 155 Desirable	U. S. Coast Guard Provisional Requirement
19	Minimum Navigation Channel Width (feet)	600	U. S. Coast Guard Provisional Requirement

^ Allow 6" additional for future resurfacing. 16.5' Desirable per TSDM §1.8.1.
^^ The 17.5' desirable vertical clearance for Ped Bridges & OH Structures & Signs is based on TSDM Sec 1.8.2
Note: The Tappan Zee Bridge is part of a Qualifying Highway.

Table D-34

Tappan Zee Bridge - Key Railroad Geometric Requirements

Element		Standard Criteria	Source
1	Design Speed (mph)	90	MNR MW4 57.1(C) i
2	Gage (inches)	56.5	AREMA 2.1.1.4a; MNR MW4 53.0(C)
3	Maximum Grade Compensated Gradient Adjustment	1.5%, 2% for short distances 0.04% per Degree of Curve	MNR MW4 62.0(C); AREMA 5.3.7.1
4	Maximum Superelevation (inches)	5	MNR MW4 57.0(C)
5	Maximum Superelevation Unbalance (inches)	3	MNR MW4 57.0(C)
6	Minimum Horizontal Curvature	1°30'	AREMA 5.3.3.1g Table 5.3.2
7	Length of Spiral (feet)	As determined by using the greatest length obtained from the formulas in subsection (j)	MNR MW4 57.4(C)
8	Minimum Vertical Curve Length (feet)	L = (D x V² x 2.15)/0.6 [D= % grade change, V=speed (mph)]	AREMA 5.3.6, Passenger Lines; MNR MW4 62.4(C)
9	Minimum Horizontal Clearance (feet)	9 from track center, AREMA 8.5 from track center, NYS Law 25 without crash wall	AREMA figure 28.1.1 NYS Railroad Law §51-a.2; BM 2.5.3, Figure 2.6
10	Minimum Vertical Clearance (feet) (see diagram below)	23 above rail, AREMA 22 above rail, NYS Law	AREMA Figure 28.1.1; NYS Railroad Law §51-a.1; BM 2.5.3, Figure 2.5
11	Minimum Track Centers Separation (feet)	14, tangent 13.5 NYS Law	MNR MW4 62.1(C); NYS Railroad Law §51-a.4
12	Structure Live Load Freight Commuter Rail Only	 Cooper E80 286,000 lbs GRL Historic 315,000 lbs GRL Proposed 80,000 lbs Maximum Axle Load Not set	AREMA 8.2.2.3c, 15.1.3.3a
13	Electrification (See Diagram Below)	Bottom Contact 3rd Rail	MNR drawing SP-101
14	Safety Walkways (inches) 1. Walking Surface 2. 56" Above Walking Surface (Headroom) 3. 80"Above Walking Surface (Headroom)	 24 30 24	NFPA130, 6.2.1.11 Egress for Passengers NFPA 130,6.3 Construction Material
15	Minimum Clearance Over Shipping Channel (feet)	139 at Existing Piers, 155 Desirable	U. S. Coast Guard Provisional Requirement
16	Minimum Navigation Channel Width (feet)	600	U. S. Coast Guard Provisional Requirement

- **Park-and-Ride Facilities.** Park-and-ride facilities supporting express bus and commuter rail service located within one mile of the corridor are as follows:

Rockland County:	Ramapo:	Suffern: six (6) lots in downtown Suffern
		Monsey: Route 59 (former movie drive-in) 271 spaces
		Spring Valley: vicinity of PVL station: five (5) lots: 264 spaces
	Clarkstown:	Interchange 14: Route 59 & Thruway: three lots: 493 spaces
		Middletown Road & Route 59: 25 spaces
		Smith Street & Route 59: 286 spaces
		North Middletown Road & Exit 10 on PIP: 101 spaces
		Interchange 12: Palisades Mall – Lot J: 900 spaces
		Route 59 & Route 303: two Lots: 430 spaces total
	Orangetown:	Nyack: Main Street & Catherine St: 46 spaces
		Nyack: Spear Street & Piermont St. 90 spaces
Westchester County:	Elmsford:	Route 119 & Saw Mill River Parkway: 20 spaces

- **Bus Facilities:** There are no special-use bus facilities in the corridor, with the exception of the Westchester County Transit Center and the Bus Station at Parking Lot J in Palisades Mall. Within and surrounding the Westchester County Transit Center on the adjoining curbs, there are embarkation locations for approximately 18 buses. Westchester County's Bee-Line Bus service has depots in Valhalla and Yonkers. The Parking Lot J facility has space for three buses.

- **Capacity:** A capacity analysis was conducted for the 7-8 AM and 4-5 PM peak periods based on bus ridership data provided by various sources but mostly from Rockland and Westchester County Departments of Transportation. The capacity was measured as the ratio of ridership to bus capacity during the peak hours.

- **Rockland County:** The analysis of 12 Rockland Bus Lines, including TOR lines 59,91,92,93, 97; TZX; Monsey Loop 3, and five Clarkstown Mini routes based primarily on 2005 ridership data was conducted. All bus lines analyzed operate with less than 50% occupancy during the peak hours, except for the TOR 91 (69% AM and 44% PM) and TZX (70% AM and 61% PM).

- **Westchester County:** The analysis of 38 Bee-Line routes (28 local lines, nine shuttle loops and one express route) was based on 2003 ridership data. All but one of the 38 bus lines operate below capacity in the peak direction during weekday peak hours. The 76 line serving Port Chester and Rye exceeded capacity by a small amount in the AM peak hour only. Overall, 20 routes operate with an average occupancy rate of less than 50% in the AM peak and 26 routes operate below 50% during the PM peak hour.

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D.4.1.1 Future Plans for Existing Bus Service Improvements

Both Rockland and Westchester Counties have extensive bus service networks with service operating throughout the day. Plans included on the TIP for improving the services include:

- Project 882300: Rockland County DOT – Tappan Zee Express bus expansion.
- Project 8TRM84: Westchester County DOT – Bus fleet expansion and replacements.
- Project 882297: Westchester County DOT – Maintenance facility expansion and improvements.
- Project 8TRM89: Westchester County DOT – White Plains Trolley Buses.
- Project 882161: Orange County DOT – OWL Express Bus expansion.

NYMTC includes Long Range Transportation Projects (LRTP) for the period 2005-2030 in their Regional Transportation Plan. Those long range transit improvement projects and studies in the Lower Hudson Valley that are specifically related to the existing bus service in the corridor include the following:

LRTP- Rockland County

- Neighborhood Shuttle Buses: Rockland County
- Intermodal Center at Thruway Interchange 14: NYSDOT/Rockland County
- Integration of OWL and Tappan ZEExpress bus services: NYSDOT/Rockland County
- Rockland County Park and Ride Study Recommendations: NYSDOT/Rockland County

LRTP - Westchester County

- Route 9A Truck Route Upgrade: NYSDOT
- Westchester Park and Ride Study Recommendations: Westchester County
- Westchester Avenue Signal Prioritization for Transit: Westchester County
- Central Avenue Transit Emphasis Corridor: Westchester County
- Bus Garage SE Westchester County: Westchester County

D.4.1.2 Infrastructure

Existing bus service operates on I-87/I-287 and the major arterial routes in the corridor including Route 59 in Rockland County and Route 119 and Route 120 in Westchester County. The buses operate in mixed traffic on these roadways with no exclusive transit infrastructure. Other than shelters and benches at bus stops, there is currently minimal infrastructure devoted to the existing bus service. The DEIS BRT alternatives will consider separating buses from mixed traffic by using busways and bus lanes to provide more efficient and reliable service. On street service would be improved by using turn-outs, traffic signal preemption and other improvements to provide the most efficient service.

D.4.1.2.1 BRT Design Criteria

BRT geometric design criteria is provided for the three proposed alignments that will be developed in the DEIS. These include BRT in HOV lanes on the Thruway mainline (Table D-35), busways outside the I-87/I-287 mainline (Table D-36), and bus lanes on existing arterials (Table D-37).

Table D-35

Concurrent Mainline BRT (HOV) Lane Geometric Standards

	Element	Standard Criteria^	Source
1	Design Speed (mph)	70	HDM §24.2.3.2
2	Minimum Lane Width (feet)	12, 11 With documentation	HDM §24.2.3.4 A, §24.2.7.2; AASHTO HOV Facilities Guide
3	Minimum Left Shoulder Width (feet) BRT HOV Lanes Dedicated Enforcement Area (Left)	 10 2 14	HDM §24.2.3.4B, C, §24.2.7.2; AASHTO HOV Facilities Guide; FHWA HOT Lane Guide
	Right Buffer Area Width (feet) Minimum Maximum	1, 4 Desirable^^ 14, 10 Allowable^^	
4	Minimum Bridge Roadway Width (feet)	Match approach highway	BM §2.3.1, Table 2-1
5	Maximum Grade [Rolling]	3%	NYSTA
6	Horizontal Curvature, Min. Radius @e=8% (feet) @e=6%	 1810 2040	HDM §2.7.1.1F Exhibit 2-2
7	Maximum Superelevation Rate	8%, 6% may be used in urban and suburban areas	HDM §2.7.1.1G
8	Minimum Stopping Sight Distance (feet)	730	HDM §2.7.1.1H, Exhibit 2-2
9	Minimum Horizontal Clearance (feet)	Shoulder width (not less than 4)	HDM §2.7.1.1I; AASHTO HOV Facilities Guide
10	Mini. Vertical Clearance (feet) Vehicular Bridges Rehabilitation* Replacement** Pedestrian Bridges OH Sign Structures & Signs	 14, 14.5 Desirable 14¤, 16.5 Desirable¤ 15, 17.5 Desirable¤¤ 15, 17.5 Desirable¤¤	HDM §2.7.1.1J; BM §2.4.1, Table 2-2
11	Pavement Cross Slope	1.5% min; 2% max	HDM §2.7.1.1K
12	Maximum Rollover Between Lanes At edge of Traveled Way	 4% 8%	HDM §2.7.1.1L
13	Structural Capacity Rehabilitation* Replacement**	 HS20, H25 Desirable HL93, NYSDOT Design Permit Vehicle	HDM §2.7.1.1M; BM §2.6; TSDM §2.1
14	Minimum Level of Service	Higher than General-Use lanes, not less than C	HDM §24.2.3.3
15	Control of Access	Designated Ingress/Egress Locations	HDM §24.2.7.3
16	Pedestrian Accommodation	Prohibited	NYS Highway Law, Article 1, §3.2
17	Minimum Median Width (feet)	22	HDM §24.2.7.2, Figure 24-13b

^ Concurrent BRT lane standards are governed by those of the adjoining Thruway mainline. See Table D-12.
^^ Buffer widths between 4 feet and 10 feet are not deemed appropriate.
* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement
¤ Allow 6" additional for future resurfacing. 16.5' Desirable per TSDM §1.8.1.
¤¤ The 17.5' desirable vertical clearance for Ped Bridges & OH Structures & Signs is based on TSDM Sec 1.8.2

Table D-36

Busway Geometric Standards

Element		Standard Criteria			Source
		Single Lane One-Way	Barrier Separated Two-Way	Undivided Two-Way	
1	Design Speed (mph)	70	70	45	HDM §24.2.3.2, §24.2.6
2	Minimum Lane Width (feet)	12 , 11 with documentation	12 , 11 with documentation	12 , 11 with documentation	HDM §24.2.6.2 Figs. 24-11, a, b
3	Minimum Shoulder Width (feet) Left Right Enforcement Area	2, 4 Des. 8, 10 Des. 14	2, 4 Des. 8, 10 Des. 14	- 8, 10 Des. 14	HDM §24.2.6.2 Figs. 24-11, a, b
4	Minimum Bridge Roadway Width (feet)	Match Busway width	Match Busway width	Match Busway width	BM §2.3.1, Table 2-1 TSDM
5	Maximum Grade [Rolling]	4%	4%	7%	HDM §2.7.1.1E, Exhibit 2-2; HDM §2.7.2.2E, Exhibit 2-4
6	Horizontal Curvature, Min. Radius (feet) @e=8% @e=6% Undivided @e=4%	1810 2040	1810 2040	711	HDM §2.7.1.1F, Exhibit 2-2; HDM §2.7.2.2F, Exhibit 2-4
7	Maximum Superelevation Rate	8%, 6% allowed in urban/suburb areas	8%, 6% allowed in urban/suburb areas	4%	HDM §2.7.1.1G, §2.7.2.2G
8	Minimum Stopping Sight Distance (feet)	730	730	360	HDM §2.7.1.1H, Exhibit 2-2; HDM §2.7.2.2H, Exhibit 2-4
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail	15 Shoulder width (not less than 4)	15 Shoulder width (not less than 4)	15 Shoulder width (not less than 4)	HDM §2.7.1.1I
10	Minimum Vertical Clearance (feet)	14, 14.5 Desirable	14, 14.5 Desirable	14, 14.5 Desirable	HDM §2.7.1.1J, §2.7.2.2J; BM §2.4.1, Table2-2
11	Pavement Cross Slope	1.5% min; 2% max	1.5% min; 2% max	1.5% min; 2% max	HDM §2.7.1.1K, §2.7.2.2K
12	Maximum Rollover Between Lanes At edge of Traveled Way	4% 8%	4% 8%	4% 8%	HDM §2.7.1.1L, §2.7.2.2L
13	Structural Capacity	HL-93, NYSDOT Design Permit Vehicle	HL-93, NYSDOT Design Permit Vehicle	HL-93, NYSDOT Design Permit Vehicle	HDM §2.7.1.1M, §2.7.2.2M; BM §2.6, TSDM §2.6.1, 2.6.2
14	Minimum Level of Service	Higher than General Use lanes, not less than C	Higher than General Use lanes, not less than C	Higher than General Use lanes, not less than C	HDM §24.2.3.3
15	Control of Access	Full	Full	Full	HDM §2.7.1.1O
16	Pedestrian Accommodation	At Stations	At Stations	At Stations	ADAAG
17	Minimum Median Width (feet)	NA	10	NA	HDM §24.2.6.2 Figure 24-11a, b
Prototypical Buses – Standard - 8.5 feet wide by 10 feet high by, 30, 35, 40 feet long Articulated - 60 feet long Double articulated – 80 feet lon					

Table D-37

Concurrent On-Street Bus Lane Geometric Standards

Element		Indicative Criteria Urban Arterials	Indicative Criteria Local Streets	Source
1	Design Speed (mph)	60	30	HDM §24.4.1.1; HDM §2.7.2.2A (Urban Arterials); HDM §2.7.4.2 A(Local Streets)
2	Minimum Lane Width (feet)	11, 12 Desirable	11, 12 Desirable	HDM §24.4.2.3; AASHTO HOV Guide
3	Minimum Shoulder Width (feet)	5	5	HDM §2.7.2.2C, Exhibit 2-4 ; HDM §2.7.4.2C, Exhibit 2-8; AASHTO HOV Guide
4	Minimum Bridge Roadway Width (feet)	Match approach highway	Match approach highway	BM §2.3.1 Table 2-1; TSDM
5	Maximum Grade [Rolling]	6%	8%	HDM §2.7.2.2E, §2.7.4.2E
6	Horizontal Curvature, Minimum Radius @e=4% (feet)	1500	250	HDM §2.7.2.2F, Exhibit 2-4 ; HDM §2.7.4.2F, Exhibit 2-8
7	Maximum Superelevation Rate	4%	4%	HDM §2.7.4.2G
8	Minimum Stopping Sight Distance (feet)	570	200	HDM §2.7.2.2H, Exhibit 2-4 ; HDM §2.7.4.2H, Exhibit 2-8
9	Minimum Horizontal Clearance (feet) Without Barrier/Rail With Barrier/Rail	1.5, 3 at intersections 0	1.5, 3 at intersections 0	HDM §2.7.2.2I, §2.7.4.2I
10	Minimum Vertical Clearance (feet)	14, 14.5 Desirable	14, 14.5 Desirable	HDM §2.7.2.2J, §2.7.4.2J; BM §2.4.1, Table 2-2
11	Pavement Cross Slope	1.5% min, 2% max	1.5% min, 2% max;	HDM §2.7.4.2K
12	Maximum Rollover Between Lanes At edge of Traveled Way	 4% 8%	 4% 8%	HDM §2.7.4.2L
13	Structural Capacity Rehabilitation* Replacement**	HS20, HS25 Des. HL-93, NYSDOT Design Permit Vehicle	HS20, H25 Des. HL-93, NYSDOT Design Permit Vehicle	HDM §2.7.2.2M, §2.7.4.2M; BM §2.6
16	Pedestrian Accommodation	At Stations/Stops	At Stations/Stops	HDM §2.7.2.2N; HDM Ch 18; ADAAG

* Structure Rehabilitation excludes deck replacement.
** Structure Replacement includes new, reconstruction, and superstructure replacement

Prototypical Buses – Standard - 8.5 feet wide by 10 feet high by, 30, 35, 40 feet long
Articulated - 60 feet long
Double articulated – 80 feet long.

Much of the design criteria correspond to the requirements cited in Chapters 2, 5 and 24 of NYSDOT HDM and other sources referenced.

These criteria will serve as the governing standards by which the geometric characteristics of the BRT alignments developed for the DEIS alternatives will be assessed. Any design element falling short of its minimum or exceeding its maximum criterion will be categorized as non-standard, and a formal justification will need to be prepared and approved before it can be integrated into the corridor.

D.4.2 Existing Commuter Rail Transit (CRT) Service

Commuter rail transit service in the corridor is organized around five lines operated by Metro-North, with two discrete networks: East-of-Hudson and West-of-Hudson (Figure D-9). The East-of-Hudson network consists of the Hudson, Harlem, and New Haven Lines. The West-of-Hudson network consists of the Port Jervis Line (PJL) and the Pascack Valley Line (PVL). The lines in Rockland County are operated by Metro-North by agreement with New Jersey Transit (NJTransit) and serve Secaucus and Hoboken. The Hudson, Harlem, and New Haven Lines operate through Westchester County and serve GCT. Additional rail lines that provide rail freight service across the corridor in Rockland County. These are the Piermont Branch and the River Line, also referred to as the West Shore Line. The rail freight lines are discussed in more detail in Subchapter D.5.

Descriptions of each of the commuter rail lines that currently operate through the corridor are provided below, along with information about the relative capacity of each line. Jurisdictions of each of the rail lines in the corridor are presented in Table D-38. Features of each of the commuter and freight rail lines are given in Table D-39.

- **Port Jervis Line (PJL).** At the present time, the PJL is both a single - and double-track, at-grade diesel operation, and has a nominal inbound capacity of 15 trains per hour. The line originates at Port Jervis near the Pennsylvania, New Jersey, and New York border. It initially loops north through Orange County before turning south again at Salisbury-Mills Cornwall, from which it heads to Suffern. South of Suffern, the PJL operates on the NJ Transit trackage of the Bergen/Main Lines to Hoboken, New Jersey. From Suffern to Port Jervis, the line operates on trackage recently acquired by Metro-North from Norfolk Southern Railroad. It is a single-track line north of Sloatsburg, which limits the frequency of service. There are currently only five morning and six evening express trains from Suffern, and limited midday service.

  The area served by the PJL is growing, so increasing frequencies would increase ridership, and midday and reverse service would make the line more attractive. Current ridership does not exceed the capacity of the current physical structure. Double-tracking or constructing passing sidings within the existing ROW would allow the PJL to operate in both directions at the same time. Either of these improvements would permit more frequent headways and also allow for more efficient use of equipment.

  On the PJL, Metro-North could add more “local” trains in the peak hour in Orange and Rockland Counties on this mostly single-track line. However, the single track inhibits the ability to run “zone expresses” or reverse peak service. The Port Jervis Yard is at capacity, with little room for expansion. South of Suffern, where NJTransit originates many trains, the line will be close to capacity once the Access to the Region’s Core (ARC) service plan is implemented. With ARC, Metro-North could operate only one or two more trains in the peak hour. The Suffern Yard is also at capacity and NJTransit is looking for more yard space.

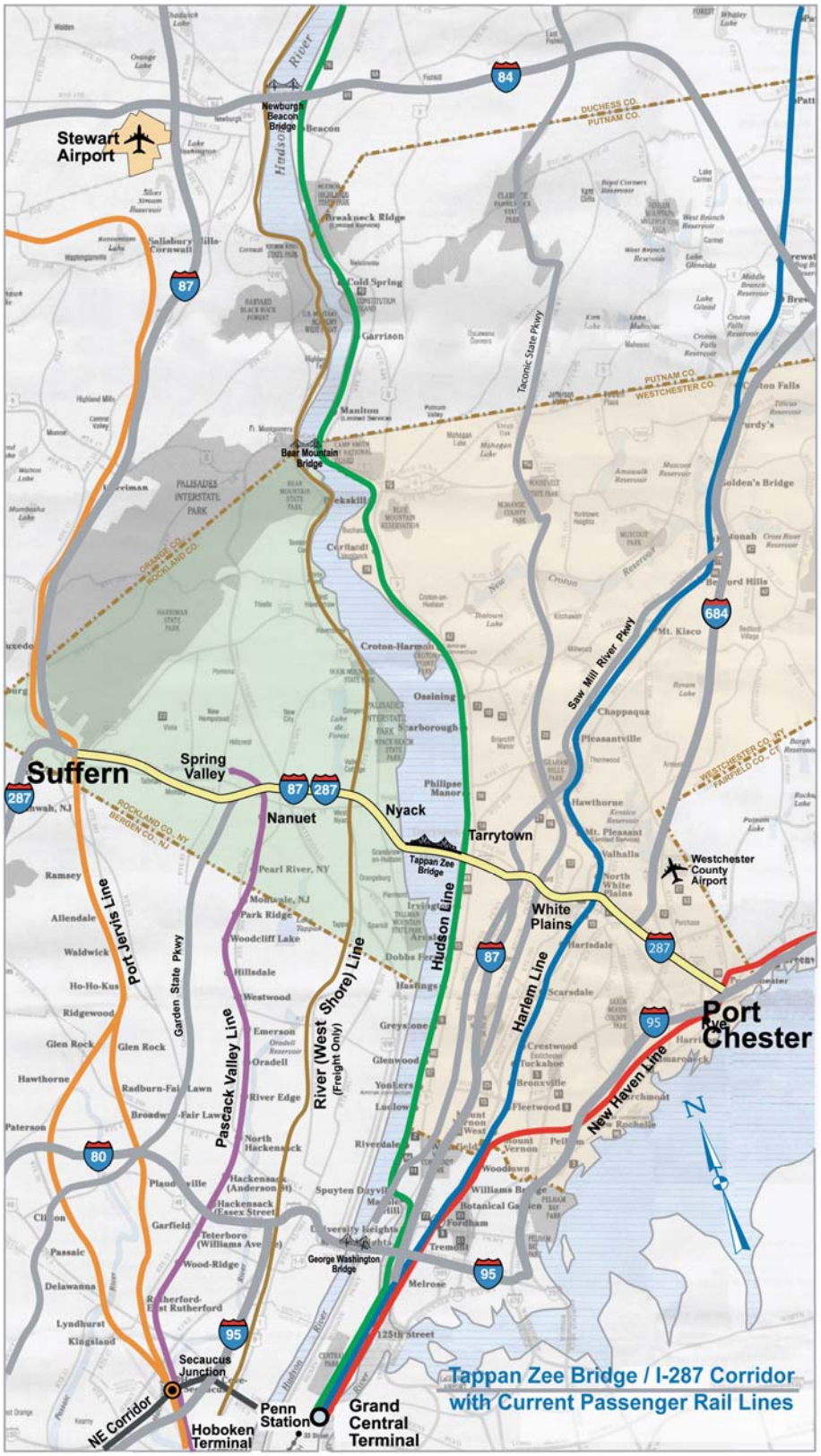

Figure D-9 Tappan Zee Bridge/I-287 Corridor with Current Passenger and Freight Rail Lines

Table D-38

Railroad Jurisdictions

Facility	Owner	Dispatcher	Maintenance Jurisdiction	Operator	
				Freight	Passenger
Port Jervis Line	NS	NJT	MNR	NS	NJT
Piermont Branch	MNR	NS	MNR	NS	
Pascack Valley Line	MNR	NJT	NJT		NJT
River Line	CSX	CSX	CSX	CSX	
Hudson Line	MNR	MNR	MNR	CSX / CP	MNR
Harlem Line	MNR	MNR	MNR		MNR
New Haven Line	MNR	MNR	MNR	CSX	MNR

Legend: NJT = New Jersey Transit
MNR = Metro-North Railroad
NS = Norfolk Southern Railroad
CSX = CSX Railroad
CP – Canadian Pacific

Table D-39

Rail Stations and Facilities in the Corridor

Facility	Type	Station Platform	
		Type	ADA*-Compliant
Port Jervis Line	Suffern Station	Low	No
	Piermont Branch	N/A	N/A
	Hillburn Yard	N/A	N/A
Piermont Branch	(Freight only)		
Pascack Valley Line	Nanuet Station	High	Yes
	Spring Valley Station	Low	Yes
	Woodbine Yard	N/A	N/A
River Line	(Freight only)	N/A	N/A
Hudson Line	Irvington Station	High	Yes
	Tarrytown Station	High	Yes
Harlem Line	White Plains Station	High	Yes
New Haven Line	Rye Station	High	Yes
	Port Chester Station	High	Yes

Note: * ADA= Americans with Disabilities Act

- **Pascack Valley Line (PVL).** The PVL originates in Spring Valley, Rockland County, serving Nanuet and Pearl River before crossing south into New Jersey. It merges with the Main/Bergen Line just north of Secaucus. It is nearly 31 miles from Spring Valley to Hoboken. The PVL is a single-track line, formerly with seven morning departures, seven evening return trains, and no midday service. Peak direction capacity is nominally 10 trains per hour. The number of trains on this single-track line in the peak hour is close to maximum, and the Woodbine Yard at Spring Valley is at capacity.

  Even with ARC providing more capacity into Manhattan, there is little capacity for Metro-North to run more trains on the PVL. The line is limited because of numerous stations and grade crossings, with lengthy travel times to New York. There is now one train operating express from Rockland County to Secaucus. Selective passing sidings to create suitable conditions for two-way service are under construction to expand capacity between Spring Valley and Secaucus. This would increase headways and improve equipment utilization.

- **Hudson Line.** The Hudson Line is fully grade-separated and mostly electrified by underrunning third rail. It extends to Dutchess County, and runs along the eastern bank of the Hudson River through Putnam and Westchester Counties, into the Bronx and Manhattan – a distance of 76 miles from Poughkeepsie to GCT. The Hudson Line has four tracks where it crosses the corridor, but narrows to two tracks through the Bronx. The current service is at a high level, averaging 15-minute headways; express service is currently operated from Croton-Harmon, Ossining, Tarrytown, and Hastings. Frequencies could be increased to achieve 10-minute headways between Tarrytown and GCT.

- **Harlem Line.** The Harlem Line begins in Wassaic, also in Dutchess County, and continues south through the heart of Putnam and Westchester Counties into the Bronx, where it joins the Hudson Line at Mott Haven junction – a distance of 77 miles. The Harlem Line is a two-track system in the vicinity of the corridor and expands to three, then four tracks with the merge of first the New Haven Line and then the Hudson Line. The Harlem Line has a high level of peak-period service between White Plains and GCT in the morning peak period, averaging less than 10-minute headways. There are locations where capacity improvements would enhance opportunities to increase service.

- **New Haven Line.** The New Haven Line begins in Connecticut, paralleling I-95 and the Long Island Sound shore, and enters New York State in Westchester County. The line continues into the Bronx, joining the Harlem Line at a point just north of Woodlawn Station. The length of the New Haven Line from New Haven to the junction with the Harlem Line is 61 miles. The line has four tracks and is also mostly electrified, although most of the line in Westchester County and north to New Haven is equipped with an overhead catenary. The current service is at a high level, averaging 15-minute headways from Stamford. There is sufficient capacity on the New Haven Line to increase the number of trains during the peak period.

Maximum overall AM peak-hour inbound capacity of the East-of-Hudson system is approximately 60 trains per hour as presently configured. Corresponding outbound capacity during the inbound peak is approximately 30 trains per hour.

D.4.2.1 Future Plans for Improvement to Existing CRT Facilities

Metro-North is responsible for all improvements to existing service within the corridor. NJTransit is responsible for improvements within New Jersey that affect travel in the corridor, including the major project to construct a new Hudson River tunnel (ARC) to connect the Port Jervis and Pascack lines at Secaucus Station directly to a new station beneath 34th Street in Manhattan, adjacent to Penn Station. Metro-North planned projects include:

- Metro-North Project M503-03-03 Restoration of the Moodna/Woodbury Viaduct in Orange County
- Metro-North Project M503-03-05 Bridge repair and replacement on the Port Jervis Line
- Metro-North Project M601-01-01 Replacement and expansion of vehicle fleet
- Metro-North Project M502-02-TA Restoration of the Tarrytown Station building

NYMTC includes Long Range Transportation Projects (LRTP) for the period 2005-2030 in their Regional Transportation Plan. Those long range transit improvement projects and studies in the Lower Hudson Valley that are specifically related to the existing commuter rail service in the corridor include the following:

LRTP- Rockland County

- Suffern Commuter Parking Needs: NYSDOT/ Village of Suffern/Rockland County
- Port Jervis Line Increase Capacity: Metro-North/NJ Transit
- Increase Capacity on Pascack Valley Line with New Sidings: Metro-North

LRTP - Westchester County

- Port Chester Intermodal Center: Westchester County
- Port Chester Railroad Station Parking Garage: Westchester County
- GM Sleepy Hollow Development with Train Station: Metro-North
- Hudson Line Joint User Rail Study Recommendation: Amtrak/ Metro-North

D.4.2.2 Infrastructure

This section presents the existing CRT infrastructure for each rail line that crosses the corridor. The Rockland County CRT options that will be developed and analyzed in the DEIS will connect to the Port Jervis Line in Hillburn, cross the Hudson River on a replacement Tappan Zee Bridge and connect to the Hudson Line north of Irvington Station.

D.4.2.2.1 CRT Design Criteria

Commuter rail guideways are confined to exclusive ROWs primarily for safety and to permit higher operating speeds. The desirable space to accommodate a set of two commuter rail tracks at grade is dependent upon track spacing and horizontal clearance from track centers. Greater width would be required at stations where platforms would require additional width.

CRT systems operate most efficiently on flat grades and therefore are generally designed for gradients of 2 percent or less. In rolling terrain, such as in Rockland County, maintaining a relatively flat west-to-east

gradient relative to the natural grade requires open cuts, tunnels, embankments, and viaducts. In addition to flat profile grades, commuter rail horizontal alignments operate best with minimal curvature and when required should be long, gentle curves. Tight curves can reduce speeds, lower service levels, cause undesirable noise levels, require more maintenance, and reduce ride quality; all things to be minimized or avoided completely.

Geometric design criteria for new commuter rail lines to be developed in the DEIS are included in Table D-40.

D.4.2.2.2 Safe Operating Speeds – Non Standard Features

Safe operating speeds for existing commuter and freight rail traffic are developed for track segments based on rail condition, curvature, grades, switching requirements, yard and station areas, conflicts with other train traffic, headways, and other parameters. As such, existing geometric elements including horizontal curvature and grades are generally not compared to the design criteria for new alignments as a means of identifying non-standard features. However, vertical and lateral clearances in relation to track location and elevation can restrict and/or prohibit the passage of train traffic, particularly freight, over certain rail lines. In the areas where the detailed rail inventory was performed, there were no vertical or horizontal clearance restrictions identified. Safe operating speeds for rail line segments crossing the corridor are depicted in Table D-41.

The Rockland County CRT options will connect to the Port Jervis Line in Hillburn where the current operating speed is not specifically known; however since current commuter rail service includes a stop at the NJTransit Suffern Station just south of the existing yard at Hillburn, speeds are assumed to be relatively low in the vicinity of where the proposed CRT connection will be made. At the connection to the Hudson Line north of the Irvington Station, track speeds are 75 mph maximum.

D.4.2.2.3 Power Systems

Power is supplied to the existing passenger lines in the study area through either an overhead catenary system or an electrified third rail. The New Haven Line contains an overhead catenary power system. The Hudson and Harlem Lines both receive power through electrified third-rail systems. The Port Jervis Line, Pascack Valley Line, Piermont Branch, and River Line have no external power systems installed.

Table D-40

Key Railroad Geometric Requirements

	Element	Standard Criteria	Source
1	Design Speed (mph)	90	MNR MW4 57.1(C) i
2	Gage (inches)	56.5	AREMA 2.1.1.4a; MNR MW4 53.0(C)
3	Maximum Grade Compensated Gradient Adjustment	1.5%, 2% for short distances 0.04% per Degree of Curve	MNR MW4 62.0(C); AREMA 5.3.7.1
4	Maximum Superelevation (inches)	5	MNR MW4 57.0(C)
5	Maximum Superelevation Unbalance (inches)	3	MNR MW4 57.0(C)
6	Minimum Horizontal Curvature	1°30'	AREMA 5.3.3.1g Table 5.3.2
7	Length of Spiral (feet)	As determined by using the greatest length obtained from the formulas in subsection (j)	MNR MW4 57.4(C)
8	Minimum Vertical Curve Length (feet)	$L = (D \times V^2 \times 2.15)/0.6$ [D= % grade change, V=speed (mph)]	AREMA 5.3.6, Passenger Lines; MNR MW4 62.4(C)
9	Minimum Horizontal Clearance (feet)	9 from track center, AREMA 8.5 from track center, NYS Law 25 without crash wall	AREMA figure 28.1.1 NYS Railroad Law §51-a.2; BM 2.5.3, Figure 2.6
10	Minimum Vertical Clearance (feet) (see attached Fig. 28-1-1)	23 above rail, AREMA 22 above rail, NYS Law	AREMA Figure 28-1-1; NYS Railroad Law §51-a.1; BM 2.5.3, Figure 2.5
11	Minimum Track Centers Separation (feet)	14, tangent 13.5 NYS Law	MNR MW4 62.1(C); NYS Railroad Law §51-a.4 ;
12	Structure Live Load	Cooper E80	AREMA 8.2.2.3c, 15.1.3.3a
13	Electrification	Bottom Contact 3rd Rail	MNR drawing SP-101
14	Safety Walkways (inches) 1. Walking Surface 2. 56" Above Walking Surface (Headroom) 3. 80"Above Walking Surface (Headroom)	 24 30 24	 NFPA130, 6.2.1.11 Egress for Passengers NFPA 130,6.3 Construction Material
15	Tunnels Min. Horizontal Clearance (feet) Min. Vertical Clearance (feet) Max. emergency egress spacing (feet) Single bore To fire-walled refuge	 9 from track center, AREMA 8 from track center, NYS Law 23 above rail, AREMA 2500 800	 AREMA Figures Single Track 28-1-3, Double Track 28-1-4; NYS Railroad Law §51-a.2 AREMA Figures 28-1-3, 28-1-4 NFPA 130 6.2.2.2 NFPA 130 6.2.2.3.2
16	Tunnel Ventilation Design fire load (Megawatt) Exhaust Purge Rate	As determined by the greatest criteria developed from the model	NFPA 130 NFPA 502 ASHRAE (2007) for Tunnel Ventilation

Table D-41

Safe Operating Speeds of Existing Rail Lines Crossing the Corridor

Facility	No. of Tracks	MP Segment		ROW Width (feet)		Operating Speeds (mph)				Geometry	
		Begin	End			Passenger		Freight		Maximum Radius (feet)	Maximum Grades
				Min	Max	Min	Max	Min	Max		
Port Jervis Line	2	31.85	34.49	66.00	100.00	40	60	40	40	1910	0.68%
Piermont Branch	1	0.00	3.09	66.00	156.00	None	None	10	10	1433	0.50%
Pascack Valley Line	1	28.00	31.03	53.00	125.00	20	60	10	40	739	1.16%
River Line	1	24.40	26.00	66.00	147.00	None	None	40	50	1910	0.75%
Hudson Line	4	22.00	26.00	99.00	265.00	50	75	60	60	1297	0.52%
Harlem Line	2	22.00	24.00	70.00	300.00	35	60	None	None	1185	0.70%
New Haven Line	4	24.00	26.00	55.00	135.00	45	75	45	50	1910	0.55%

D.4.2.2.4 Signals and Switches

The existing signal system within the inventory study area consists of either an automatic traffic control system or manual block. Switches within the study area consist of remote-controlled power- operated switches and hand-operated switches with and without circuit controllers. The following lines are equipped with an automatic traffic control system, remote-controlled power-operated switches and hand-operated switches with circuit controllers:

- Hudson Line
- Harlem Line
- New Haven Line
- Pascack Valley Line
- Port Jervis Line
- River Line

The Piermont Branch is equipped with a manual block signal system and hand-operated switches without circuit controllers.

D.4.2.2.5 Trackbed

The Hudson and New Haven Lines have track beds consisting of crushed stone, concrete ties, continuous welded steel rails and a typical four-track section. The Harlem Line, Port Jervis Line, Pascack Valley Line, and the River (West Shore) Line have track beds consisting of crushed stone, wooden ties, continuous welded steel rails and a typical two-track section. The Piermont Branch track bed consists of crushed stone, wooden ties, jointed steel rails and a single-track typical section.

All of the rail lines are in excellent condition, with the exception of the Piermont Branch, which is in fair condition. The typical sections of all the rail lines meet current standards.

D.4.2.2.6 Drainage

Drainage for all rail lines is accomplished through a series of open ditches adjacent to the trackbed which flow to adjacent streams, watercourses, or other water bodies. Cross culverts exist as necessary to aid in the collection and distribution of runoff. All culverts are in generally good condition, and no current drainage problems have been identified.

D.4.2.2.7 Structures

Bridges carrying railroads over highways and/or watercourses through the project area were reviewed. The over-rail-line bridges are owned and maintained by public jurisdictions and/or private owners and were not part of this study. All bridges owned and maintained by railroads were reviewed. No load restrictions were identified, and all structures function as originally designed.

D.4.2.2.8 Yards

The Hudson, Harlem, New Haven, and River (West Shore) Lines and the Piermont Branch have no yards in the study area. The two facilities in the study area are:

- **Port Jervis Line:** MP 31.35 Hillburn Yard (freight and passenger)
- **Pascack Valley Line:** MP 31.20 Woodbine Yard (passenger only)

D.4.3 Existing Ferry Service

The Hudson River functions largely as a barrier in this corridor for typical transit systems, limiting the opportunities to travel from east to west. However, the river has the potential to serve as an opportunity with the provision of ferry service. Ferry service exists between Haverstraw and Ossining and Newburgh and Beacon. There is long-distance ferry service from Yonkers to Manhattan, but the previous service from Haverstraw to Manhattan has been discontinued.

D.5 Existing Rail Freight Service in the Corridor

Rail freight is accommodated within the corridor on existing passenger rail lines and independent track facilities. Jurisdiction, facilities and safe operating speeds are included in Tables D-38, D-39 and D-41, respectively. Freight service provided by rail lines within the corridor is as follows:

- **Hudson Line;** An average of six freight trains per day operated by CSX and Canadian Pacific Railway use the Hudson Line in conjunction with passenger rail traffic

- **Harlem Line;** No freight trains use the Harlem Line

- **New Haven Line;** An average of four freight trains per day operated by CSX use the New Haven Line in conjunction with passenger rail traffic

- **Port Jervis Line;** A rail yard operated by Norfolk Southern is located in Hillburn just north of the NYS Thruway. An average of four freight trains per day use the PJL south of this facility, and an average of two freight trains per day use the PJL north of the yard

- **Pascack Valley Line;** No freight trains use the PVL

- **Piermont Branch;** The Piermont Branch is a freight rail spur owned by Metro-North beginning in Suffern at the PJL just south of the NYS Thruway, proceeding east approximately 3.1 miles to Spook Rock Road in Airmont. An average of 1 train per week operated by Norfolk Southern uses this facility to service a lumber yard near the eastern terminus. A number of inactive rail sidings are located along the branch, servicing warehousing operations to the west of Airmont Road.

- **River (West Shore) Line;** This facility, owned and operated by CSX Railroad, is the major north -south freight rail line connecting the Selkirk Yard near Albany with northern New Jersey. It consists of one to two tracks and accommodates an average of 24 trains per day. The River Line crosses the NYS Thruway approximately 0.6 miles west of Interchange 12 in West Nyack.