New NY Bridge Mass Transit Task Force

Final Transit Recommendations

February 2014

THE NEW NY BRIDGE

New York State
Thruway Authority

New York State
Department of Transportation

Acknowledgements

The members of the Mass Transit Task Force (MTTF) rose to the challenge of meeting larger regional needs, while recognizing that all individual ideas may not be integrated into the final proposal. This collective effort resulted in a set of consensus recommendations supported by all MTTF members.

The Co-Chairs of the MTTF, New York State Department of Transportation Commissioner Joan McDonald and New York State Thruway Authority Executive Director Thomas Madison are deeply grateful for the time and effort contributed by each MTTF member, their staff and delegates, and the broader community.

The collective contributions of all helped shape the future of transit in the Lower Hudson Valley.

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Contents

1 Introduction

Providing meaningful mass transit choices in the Lower Hudson Valley will improve regional mobility, support regional aspirations for economic growth, enhance access to major employment centers and allow for their growth, increase the resiliency of the transportation network, and offer sustainable travel options.

New York State Governor Andrew M. Cuomo recognizes the important role transit plays in connecting communities of the Lower Hudson Valley and understands the importance of replacing the Tappan Zee Bridge (TZB) as quickly and cost effectively as possible. As the State of New York prepared to move forward with the design and construction of the replacement to the TZB, it was clear that questions remained about the type of transit system that could operate on the bridge. In order to allow the bridge project to move forward while also ensuring time for analysis of the best transit system, Governor Cuomo decided to put the development of transit proposals on a separate track from the bridge replacement project, with a commitment to integrate a transit system with the new bridge. This commitment resulted in the New NY Bridge (NNYB) being built to physically support the additional weight of rail infrastructure.

To determine the transit system, the New York State Thruway Authority (NYSTA) and the New York State Department of Transportation (NYSDOT) selected a group of leaders from the region with a common purpose of identifying a regional transit proposal. In December 2012, a 31-member body known as the Mass Transit Task Force (MTTF) was convened and asked to put forward a transit proposal that could be implemented by opening day of the NNYB. The MTTF represents key stakeholders from around the region who have an interest in developing transit across the I-287 corridor and in their local communities.

The MTTF referenced and built upon previous planning efforts to formulate a prioritized list of **short-, mid-, and long-term transit recommendations** for the I-287 corridor in conjunction with construction of the NNYB that was fiscally-viable and had consensus support of local representatives. The MTTF worked with a team of technical advisors to meet the existing travel needs of residents of Rockland and Westchester Counties and to maximize existing transportation infrastructure to accommodate changing demand in a cost-effective manner.

A significant body of work exists from previous studies and reports. The results of those studies helped the MTTF quickly analyze the many different possibilities for transit and put forward a package of short-, mid-, and long-term transit recommendations for the I-287 corridor and across the NNYB. Additional studies were conducted by the MTTF to supplement previously existing work.

The MTTF was tasked with making recommendations that are fiscally viable and meet the transit needs of the region. The recommendations contained in this final report achieve both of those goals.

2 The Mass Transit Task Force

Who was involved?

The MTTF is a 31-member body co-chaired by Joan McDonald, Commissioner of NYSDOT and Thomas J. Madison, Jr., Executive Director of NYSTA.

In establishing the MTTF, stakeholders in Rockland, Westchester, and Putnam Counties and transit and planning experts were offered a unique opportunity to gather and prepare a set of transit recommendations for the I-287 corridor that best addresses local communities' needs. Providing meaningful mass transit choices in the Lower Hudson Valley will improve mobility within the region, enhance the resiliency and redundancy of the regional transportation network, and support regional aspirations for economic growth by enhancing access to major employment centers on both sides of the Hudson River and allowing for their growth.

The MTTF's balanced composition included state and local officials, public advocates, community interest groups, and transit and transportation experts. Working with state, county, and local planning officials, the MTTF evaluated previous work and new proposals and shared new ideas for a transit system that best fits the needs and context of the region, all while maintaining focus on fiscal constraints and project delivery requirements. Westchester and Rockland Counties were particularly engaged throughout the process, contributing valuable data, reports, analyses, and input to support the consensus recommendations.

The MTTF met 12 times between late 2012 and early 2014 to develop their transit recommendations. In addition, 18 working sessions were held with local stakeholders to further refine the proposal. These inputs were critical to crafting and refining these recommendations.

Table 1: MTTF Members

Name	Title	Affiliation
Appointees		
Thomas J. Madison, Jr. (Co-chair)	Executive Director	New York State Thruway Authority
Joan McDonald (Co-chair)	Commissioner	New York State Department of Transportation
Robert Astorino	County Executive	Westchester County
Scott Baird	President	Nyack Chamber of Commerce
David Carlucci	Senator	New York State Senate, District 38
Bonnie Christian	Mayor	Village of South Nyack
Harriet Cornell	County Legislator	Rockland County Legislature, District 10
Jan Degenshein	Architect/Planner	Degenshein Architects
Jonathan Drapkin	President & CEO	Hudson Valley Pattern for Progress
Nuria Fernandez[1]	Chief Operating Officer	Metropolitan Transportation Authority
Drew Fixell	Mayor	Village of Tarrytown
Marsha Gordon	President	The Business Council of Westchester
Ellen Jaffee	Assemblywoman	New York State Assembly, District 97
Michael Mills	Administrator/Clerk	Village of Elmsford
John Nonna	Board Member	Westchester League of Conservation Voters
MaryEllen Odell	County Executive	Putnam County
Amy Paulin	Assemblywoman	New York State Assembly, District 88
Karen Rae	Deputy Secretary of Transportation	Governor's Office
Thomas Roach	Mayor	City of White Plains
Brandon Sall	Board Member	New York State Thruway Authority
Lawrence Salley	Former Transportation Commissioner	Westchester County
MaryJane Shimsky	County Legislator	Westchester County Board of Legislators, District 12
Christopher St. Lawrence	Town Supervisor	Town of Ramapo

[1] Departed MTA in December 2013; Replaced on the MTTF by William Wheeler, Director of Special Project Development and Planning, MTA

Name	Title	Affiliation
Andrea Stewart-Cousins	Minority Leader	New York State Senate, District 35
C. Scott Vanderhoef[2]	County Executive	Rockland County
Veronica Vanterpool	Executive Director	Tri-State Transportation Campaign
Jen White	Mayor	Village of Nyack
Robert Yaro	President	Regional Plan Association
Support Team		
Peter Casper	Assistant Counsel	New York State Thruway Authority
Anthony Durante	Transportation Planner	Arup
Kristine Edwards	Project Coordinator	New York State Department of Transportation
Ron Epstein	Chief Financial Officer	New York State Department of Transportation
Trent Lethco	Principal, MTTF Technical Director	Arup
Mark Roche	Principal	Arup
William Wheeler	Director of Special Project Development and Planning	Metropolitan Transportation Authority

It is important to note the diligent efforts of some of the delegates representing the appointed MTTF members as well as professional staff, including: Thomas Vanderbeek, Commissioner, Rockland County Departments of Planning and Public Transportation; Edward Buroughs, Commissioner, Westchester County Department of Planning; Jeffrey Zupan, Senior Fellow, Regional Plan Association; David Aukland, Member, Village of Tarrytown Planning Board; Elizabeth Cheteny, Planning Commissioner, City of White Plains; Naomi Klein, Director of Planning, Westchester County Dept. of Public Works & Transportation; and Patrick Gerdin, Principal Transportation Planner, Rockland County.

The MTTF was also assisted by a technical advisory team made up of transportation professionals from Arup, a global planning, engineering, and design firm. The technical advisory team researched past corridor planning efforts, evaluated regional travel needs, provided comparative reviews of other transit system around the United States and world, assessed potential transit modes, and conducted various transit and traffic analyses to test the proposal as it developed. These data-driven and empirical inputs helped to inform the work of the MTTF.

[2] Ed Day was elected Rockland County Executive in November 2013.

The MTTF Mission Statement, Goals and Objectives, and meeting schedule can be found in Appendix B.

3 The Mass Transit Task Force Final Recommendations Summary: A Bus Rapid Transit Network for the New NY Bridge – Simple | Fast | Reliable

The MTTF recommends a new Bus Rapid Transit (BRT) system that is simpler, faster, and more reliable than what is provided today. The BRT system will expand and enhance the existing transit system and will take advantage of extra lane capacity on the NNYB. The transit system proposed by the MTTF for the I-287 corridor fundamentally changes transportation options in Westchester and Rockland Counties. While the proposed system maintains connections to Metro-North Railroad (MNR), it goes far beyond just connecting commuters to the rail system. Many people don't realize that the travel markets within and between each county are significantly larger than travel from either county to Manhattan. The proposed system aligns with these travel markets while still serving Manhattan-bound commuters. The proposed BRT network is customized for the region with rapid deployment capability, allowing it to be in place when the NNYB opens. It is complemented by an infrastructure program that allows transit to move quickly and reliably through congestion and stay on schedule. The routes will connect more people to more places in both counties and across the bridge, whether traveling eastbound or westbound.

It is important to note that many other transit options were considered by the MTTF, including commuter and light rail options. The NNYB will be designed and constructed with the structural strength and deck capacity to support commuter or other rail transit in the future. Rail transit options are therefore included as long-term recommendations by the MTTF.

Figure 1: Cleveland HealthLine BRT (Source: wyliepoon, Creative Commons)

3.1 What will the BRT system look like?

- 7 routes (See Figure 3):
  - 3 intercounty routes connecting Rockland and Westchester Counties. These routes include intra-Rockland segments.
  - 3 intra-county routes connecting destinations in Westchester.
  - 1 route connecting Westchester County to the Bronx.
- The proposed system will serve key east/west travel markets between the two counties.
- Serving more than just Metro-North commuters, the proposed BRT system will provide connections to key regional destinations, including White Plains, Westchester Medical Center, the Palisades Center, downtown Nyack, the Platinum Mile, Empire City Casino, The Shops at Nanuet, downtown Suffern, and Westchester County Airport.
- Riders will be able to utilize a unified fare payment system, system-wide.
- Connections will be provided to existing transit, including all five Metro-North rail lines and the New York City Subway System.
- The system anticipates a refurbished White Plains TransCenter, to be studied and planned through a $1 million grant awarded to the City of White Plains by the Mid-Hudson Regional Economic Development Council.

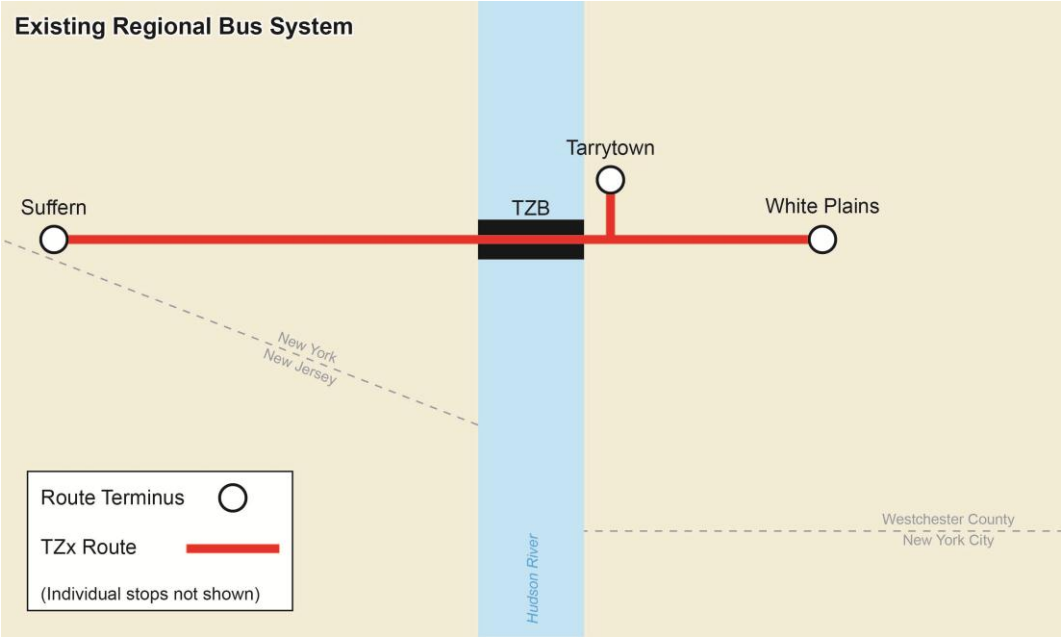

Figure 2: The region's existing regional bus system – the TAPPAN ZEExpress (TZx) – runs between communities in Rockland County and Tarrytown and White Plains in Westchester.

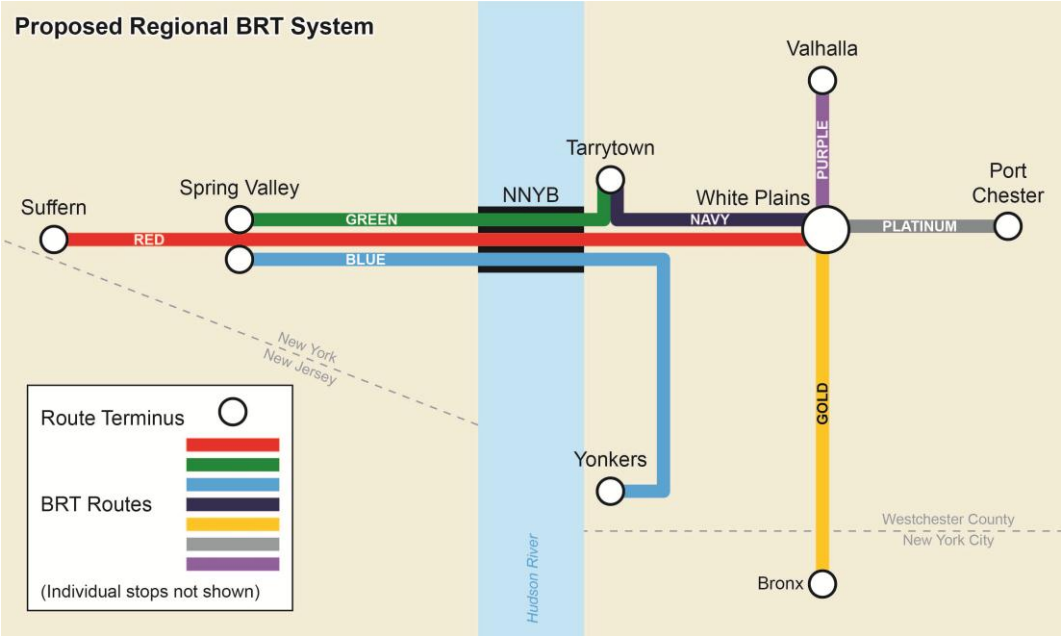

Figure 3: The recommended regional BRT system to begin operation when the NNYB opens in 2018. Local Bee-Line routes in Westchester and TOR routes in Rockland will continue to operate.

3.2 What does the BRT system offer?

A new riding experience

- Riders will be offered high-quality transit stations with passenger amenities such as seating, real-time bus arrival information, Wi-Fi at stations and on board, and protection from the elements. The system will be used to travel between or within both counties on the same vehicles with one fare card, one fare payment system, and one identity. This achieves a key objective of the MTTF – to provide travelers with an easy-to-understand, simple-to-use, and convenient transit choice.

Service expansion

- The system will provide more service throughout the day with 15- or 30-minute frequencies that also connect to local bus services and MNR while also serving key destinations (i.e., employment centers, retail centers, medical centers, etc.).

More connections

- The system is an evolution in how transit is currently provided in the Lower Hudson Valley, offering more choices and a simple system with connections to more places – whether you are traveling to MNR, downtown White Plains, the Nyacks, Suffern, Yonkers, Tarrytown, Port Chester, or points in between.

More riders

- 10,150 additional riders per day when compared to existing bus services in the corridor will make the system more productive and require lower operating subsidies.

Simplicity

- A simple route structure with three easy-to-understand “regional” services that cross the Hudson River and four “local” services that offer more connectivity.

Faster journeys

- A service that is significantly faster than what is on the street today – up to 25% faster on local roads and 20% faster on I-287.

Infrastructure upgrades

- Infrastructure improvements will make this system fast and reliable. Added lane capacity on the NNYB, technology that manages traffic and transit flows, and limited but strategic infrastructure improvements will give transit a travel time advantage. Continued

collaboration with local officials and stakeholders will be critical to ensuring the successful implementation of these infrastructure upgrades.

Improved I-287 efficiency

- The BRT transit strategy is a comprehensive, multimodal mobility program, improving travel time, speed, and reliability for everyone in the I-287 corridor located in Rockland and Westchester Counties. Technology improvements along Route 59 will smooth traffic along this critical corridor. Ramp metering, added lane capacity on the NNYB, and transit lanes in White Plains will reduce travel times and increase transit reliability across the corridor.

A "Smart Corridor" on Route 59

- Significant new traffic signal technology and signal upgrades will allow all traffic to move more quickly and reliably on Route 59. This smart technology will be complemented by transit priority measures that will allow buses to skip ahead of traffic when intersections are congested.

Doing better West-of-Hudson

- The MTTF recognizes the rail and bus services on the west side of the Hudson could be greatly improved. The MTTF encourages NYSDOT, Metropolitan Transportation Authority (MTA), and New Jersey Transit (NJT) to discuss strategies to improve West-of-Hudson rail service and access to Manhattan.

Specific elements of the transit proposal, including recommended infrastructure improvements and system operations and management options, are detailed in this report.

3.3 Recommended Short-Term Improvements

What is short-term?

- From the conclusion of the work of the MTTF in February 2014 to the NNYB opening in 2018

What is proposed in the short-term?

- New BRT Stations and Vehicles
- Simple, Legible Routing
- Dedicated Transit Lanes
- I-287 Congestion Control: Ramp Metering

- Traffic Signal Improvements
- Route 59 “Smart Corridor”
- White Plains Access and Station Area Study
- Corridor Preservation Study
- Interchange 10 Reconstruction / South Nyack Study
- New I-287/87 Interchange 14X Study
- Transportation Demand Management Programs
- Transit-Oriented Development
- West-of-Hudson Rail Improvements

3.4 Recommended Mid-Term Improvements

What is mid-term?

- Up to 15 years following completion of the NNYB

What is proposed in the mid-term?

- White Plains Station Redevelopment
- Interchange 11 Reconstruction
- West-of-Hudson Rail Improvements
- In-Line BRT Station at the Palisades Center
- New BRT Stations Along the Proposed Routes
- Expanded Park and Ride Facilities in Rockland County

3.5 Recommended Long-Term Improvements

What is long-term?

- Over 15 years beyond completion of the NNYB

What is proposed in the long-term?

- Passenger Service on the West Shore Line
- East-West Rail Options (Light Rail or Commuter Rail)

Figure 4: Rendering of NNYB (Source: TZC/HDR)

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4 History and Background

4.1 Bridge Context

The Tappan Zee Bridge opened to traffic in December 1955. It was put into service the same time as a 27-mile stretch of the New York State Thruway from Yonkers to Suffern. The bridge has become a critical transportation link in the region. However, with a limited right-of-way and no shoulder, lane closures due to accidents or repairs cause major delays for the 138,000 vehicles that cross the bridge daily.

In 1999, state and local officials began discussing a bridge replacement. Transit across the bridge became a recurring theme during the public outreach process. Over the next 12 years, studies focused on improving the I-287 corridor through highway and transit improvements. Proposals were put forth, but no project advanced beyond the planning stage.

4.2 Project Pivot

In 2011, as corridor planning activities drew to a close, a clearer picture emerged of the costs associated with improving the full I-287 corridor. The final set of improvements was estimated to cost between $15 and 17 billion. Yet how to pay for the improvements was unclear. What was clear, however, was the need for a new bridge.

In October 2011, Governor Cuomo focused on removing obstacles to building a replacement for the TZB by scaling back the full corridor project to include a new bridge only. In March 2012, a request for proposals (RFP) for a new bridge was released, and in July of that year three bids were received. In December 2012, the Governor and NYSTA announced the team selected to build the NNYB. To ensure the bridge could be built without further delay, it was decided that the bridge should allow for the addition of transit, including rail, in the future. Therefore, the NNYB is being built with the structural strength to support the additional weight of rail infrastructure.

4.3 Prior Corridor Planning

4.3.1 Tappan Zee Bridge / I-287 Corridor Project

The Tappan Zee Bridge/I-287 Corridor Study conducted by NYSTA, NYSDOT, and Metro-North Railroad (MNR) from 1999 to 2011 examined a comprehensive set of transit solutions to serve travelers along the 30-mile I-287 corridor from Suffern in Rockland County to Port Chester in Westchester County.

4.3.2 Previous Study Reports

As part of the I-287 Corridor Study, a number of individual studies were produced to identify, develop, and refine a set of corridor improvement projects. The MTTF used these documents to help inform their work. More information on each of the following studies can be found in Appendix A.

Table 2: Major Transit Studies in the I-287 Corridor

Study	Description	Date Started	Date Completed
Alternatives Analysis (AA)	Compendium of technical studies for further study in DEIS	January 2003	January 2006
Transit Mode Selection Report (TMSR)	Refined variations of the transit mode recommendations	February 2008	May 2009
Highway Improvements Report (HIR)	This report did not advance beyond the draft stage	Late 2009	November 2010
Transit Alignment Options Report (TAOR)	This report did not advance beyond the draft stage	Late 2009	May 2011
Central Avenue Bus Rapid Transit Assessment Study	Recommended BRT for corridor; provides conceptual plan with service and infrastructure	June 2007	July 2009
Route 59 Corridor Transit Operations Study	Detailed analysis of transit; endorsed BRT for corridor	June 2005	March 2007

5 Existing Conditions

5.1 Land Use Context

The I-287 corridor is located in the heart of the Lower Hudson Valley, roughly 20 miles north of New York City. (See Figure 5.) It connects two counties – Rockland and Westchester – with diverse land uses and development patterns that range from suburban to urban.

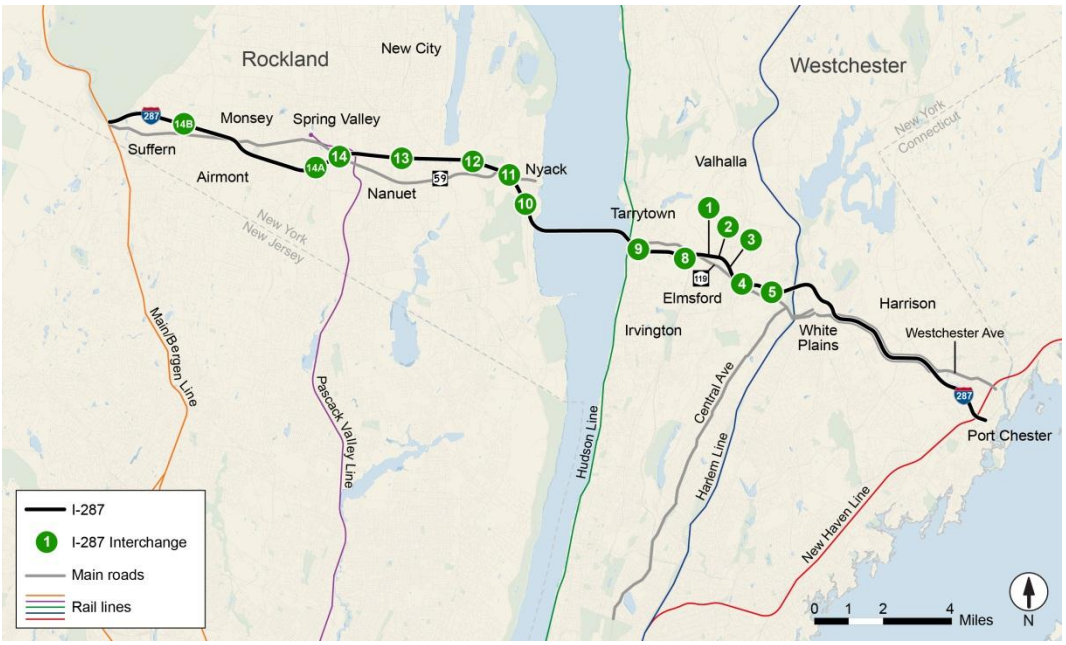

Figure 5: I-287 corridor from Suffern in the west to Port Chester in the east.

To determine which transit modes are best suited for this corridor, it is important to understand existing land uses and whether or not they effectively support transit. There are four general land use typologies found along the I-287 corridor between Suffern and Port Chester: **Suburbs**, **Corridors**, **Centers**, and **Cities**. (See Figure 6.)

Figure 6: From left to right, land use typologies for Suburbs, Corridors, Centers, and Cities.

5.1.1 Rockland County

Historically, land uses in much of Rockland County (174 square miles) were agricultural or light industrial. While rail has existed in the region for over a century, and spurred growth in villages such as Suffern, Pearl River, and Haverstraw, it was the construction of major highways (the Palisades Interstate Parkway, the New York State Thruway, and the TZB) which started suburban residential growth in earnest.

To support these new residents, commercial development accelerated along corridors such as Routes 17, 45, 59, 202, 303, and 304. Outside of the traditional villages with mixed-use centers, these commercial developments in the County are mostly “big-box” retail or shopping malls with national chains. There are also single-story strip malls, office parks, and corporate campuses.

While there are pockets of moderately dense multi-family units, the housing stock is predominantly single-family detached homes. According to the U.S. Census, there were 311,687 residents in Rockland County in 2010. The average density in Rockland is 1.6 dwelling units per acre (DUA), with the highest density being in Nanuet/Spring Valley where it is 3.2 DUA.

Along the Rockland portion of the I-287/87 corridor (see Figure 7) – from Suffern to Nyack – suburbs, corridors, and centers can be found. There are no cities in Rockland County.

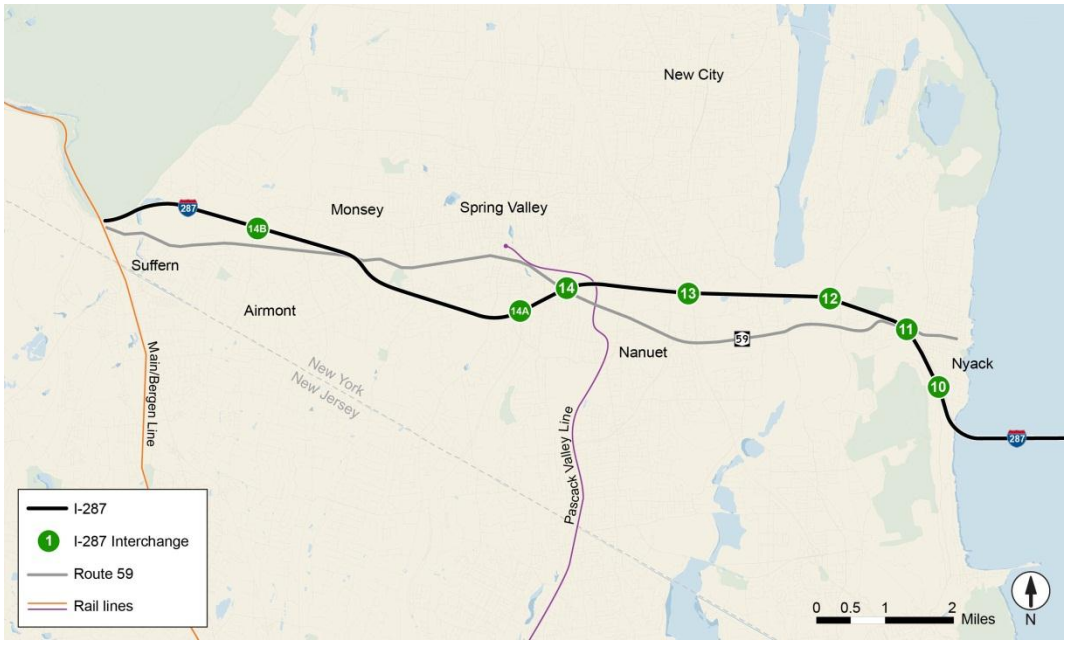

Figure 7: I-287/87 corridor in Rockland County

In the western portion of the County, Suffern is suburban with a distinct village center featuring apartments above ground-floor retail, a walkable

street grid, and access to regional transit. Airmont is comprised of mostly low-density residential with open space.

The middle of the County features a more diverse set of land uses. As Route 59 passes through Nanuet, it becomes a major multi-lane commercial corridor, with shopping centers such as the newly-refurbished Shops at Nanuet. This area has the largest concentration of commercial development in Rockland, with more than a third of the commercial land. Also along Route 59 are three centers fed by arterial routes: Monsey/Route 306, Spring Valley/Route 45, and Nanuet/Route 33. The centers along these arterials are zoned for mixed-uses and multi-family residential units, but most of the land is lower-density single-family homes.

Moving east beyond the Palisades Interstate Parkway, I-287/87 again passes through low-density residential areas before reaching two key locations: the Palisades Center and downtown Nyack. The Palisades Center is one of the nation's largest freestanding shopping malls. It can be directly accessed by Routes 59 or 303 as well as I-287/87. The Village of Nyack, at the eastern end of the corridor, has a moderately dense mix of single-family and multi-family housing units with a lively pedestrian environment. With 2.84 DUA, Nyack is one of the more densely populated centers in the County. I-287/87 passes through the Village of South Nyack before crossing the Hudson River. It has mostly low-density residential with some institutional uses.

5.1.2 Westchester County

Westchester County (430 square miles) first grew along water bodies such as the Hudson and Bronx Rivers and the Long Island Sound. Like most suburbs, subsequent transportation infrastructure in the form of rail and roads planted the seeds for major growth. Rail lines with connections to New York City, built in the mid-1800s, led to the creation of some of the first commuter suburbs in the United States. The highway network, built in the mid-1900s, helped to attract national corporations such as PepsiCo and IBM, which established corporate campuses and office parks in central Westchester.

According to the 2010 Census, the population of Westchester County is 949,113. The average residential density in Westchester is 2.7 DUA, which is higher than in Rockland County, but still considered suburban. The highest density is in downtown White Plains with 10.7 DUA.

All four land use typologies exist in Westchester County: suburbs, corridors, centers, and cities. (See Figure 6.) Tarrytown has both single-family and multi-family residential uses and a walkable town center with mixed-use zoning.

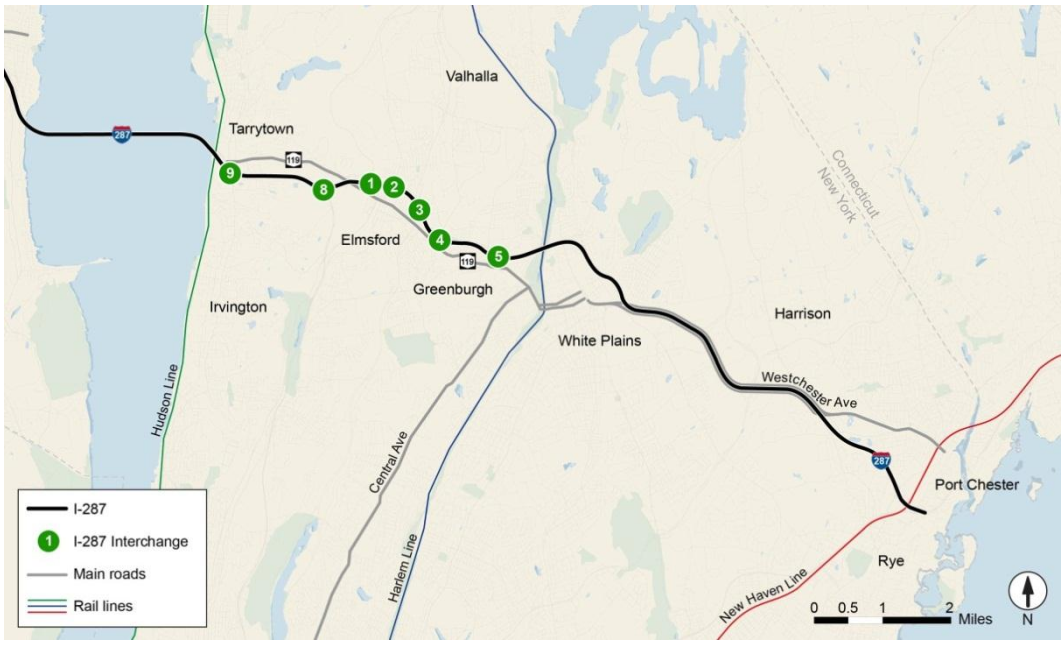

Figure 8: I-287 corridor in Westchester County

Route 119 is a major corridor running parallel to I-287. It has commercial land uses, including large retail centers and office parks, as well as higher-density multi-family residential developments. Route 119 passes through Elmsford, another center with a “main street” retail section. There are also some light industrial land uses (particularly north of Route 119), and single-family residential neighborhoods.

White Plains lies at the eastern terminus of Route 119, halfway between Tarrytown and Port Chester. As the County Seat, the city is a major government center but also features diverse residential, commercial, and institutional land uses. White Plains has the highest residential densities in the corridor with 10.7 DUA. White Plains is also a major transportation hub for buses and connections to MNR’s Harlem Line.

East of White Plains is a collection of large, corporate office developments known as the “Platinum Mile.” Land uses along the Platinum Mile are mainly accessible via Westchester Avenue, a separated, two-lane arterial couplet which parallels I-287. Sections of the Platinum Mile sit in both the City of White Plains and the Town of Harrison.

To the east of the Platinum Mile, I-287 crosses the Hutchinson River Parkway and I-684 before entering the easternmost portion of the corridor – the Villages of Rye Brook and Port Chester as well as the City of Rye. These areas around the eastern terminus of I-287 generally feature low-density suburban development patterns with the exception of Port Chester, which features a compact, walkable downtown centered on the Port Chester MNR Station. Mixed uses are common, particularly along Westchester Avenue and Main Street.

5.2 Transit

5.2.1 Rockland Transit

The non-rail public transit services offered within Rockland County are contracted out by Transport of Rockland (TOR), which is managed by the Rockland County Department of Public Transportation. The TOR system includes ten intra-county routes (seven main routes and three circulator loops) and the TAPPAN ZEExpress (TZx) which provides connections to Westchester County. The analysis for this report focused on two specific bus routes: TOR 59 – one of TOR's local bus routes that run along New York State Route 59 – and TZx. More information on all non-rail public transit in Rockland County can be found in Appendix C.

The TOR 59 operates along Route 59 from Suffern to Nyack, with a few route deviations to Rockland Community College, downtown Nanuet, West Nyack Road, and Nyack Hospital. (See Figure 9 for the TOR 59 route map.) The TOR 59 bus operates with 20 minute headways during peak periods[3] and 30 minute headways during the off-peak period. It takes approximately 75 minutes to run the 12.6 miles, with an average speed of 10 miles per hour (mph) along the length of the route. The TOR system, including TZx, carries approximately 3.3 million riders annually with about a third of those trips ending along the Route 59 corridor.

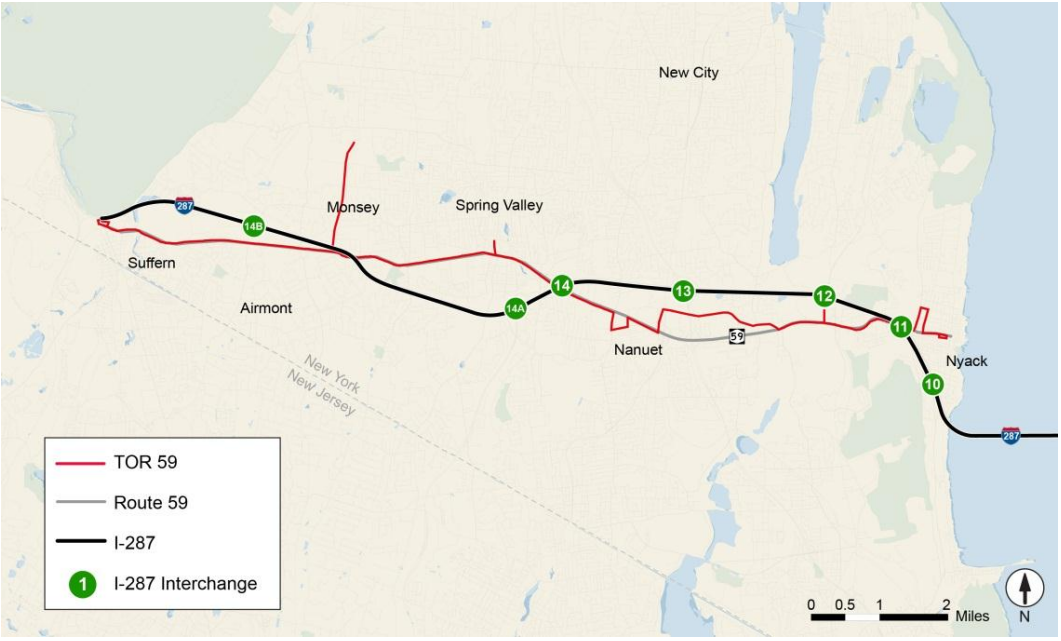

Figure 9: Existing TOR 59 routing

In addition to operating TOR, the Rockland County Department of Public Transportation is also responsible for the TZx, which is a commuter bus

[3] AM: 6:00 to 9:00; PM: 4:00 to 7:00

system connecting Rockland County to destinations in Westchester County. The TZx focuses service on Manhattan-bound MNR trains in Tarrytown and downtown White Plains. (See Figure 10 for TZx routing in the Rockland County. TZx runs several different individual route variations in this service area.)

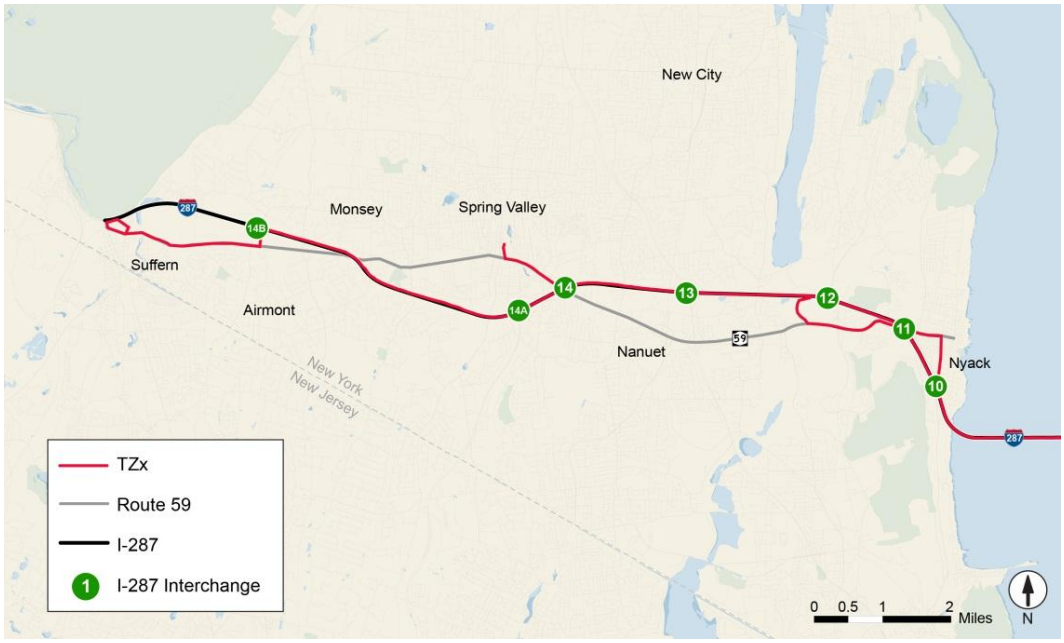

Figure 10: TZx routing in Rockland County

In addition to serving as a feeder for the commuter trains, TZx makes stops at eight locations along the corridor between Suffern and Nyack, including the Spring Valley Transit Center and the Palisades Center. The TZx has an annual ridership of approximately 470,000. During the AM peak there are roughly 23 eastbound trips and 11 westbound trips. In the PM peak there are 10 eastbound trips and 17 westbound.

There is also a trans-Hudson ferry run by NY Waterway that operates between Haverstraw in Rockland and Ossining in Westchester where passengers can connect to MNR Hudson Line service at Ossining Station.

5.2.2 Westchester Transit

The Westchester County Department of Public Works and Transportation (DPW&T) is responsible for the maintenance of traffic infrastructure as well as the management of the County bus system, the Bee-Line. Currently the DPW&T contracts out operations of their fixed route system to two vendors. The two vendors provide bus service to both urban and suburban parts of the County as well as sections of adjacent counties including Putnam, Manhattan, and the Bronx. There are 59 routes in total – 32 local routes, 11 express routes, and 16 commuter feeders. The MTTF was especially focused on Bee Line routes 20/21 and 13. The 20/21 runs along

Central Ave between White Plains and the Bronx and represents Bee-Line's busiest route. (See Figure 11 for the 20/21 route map.)

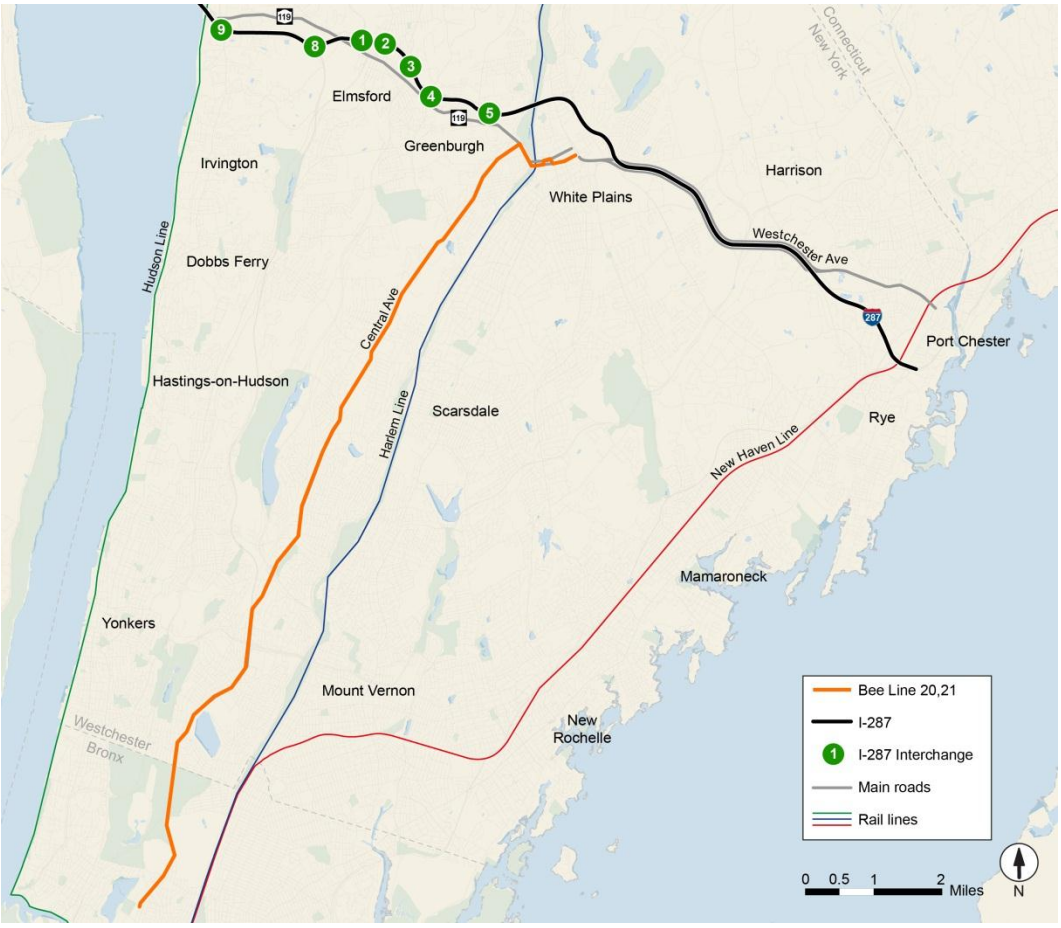

Figure 11: Bee-Line routes 20/21

Bee-Line route 13 runs from Ossining to Rye with several stops in White Plains. Through the I-287 corridor, the 13 uses Route 119 and Westchester Avenue. (See Figure 12 for the 13 route map.)

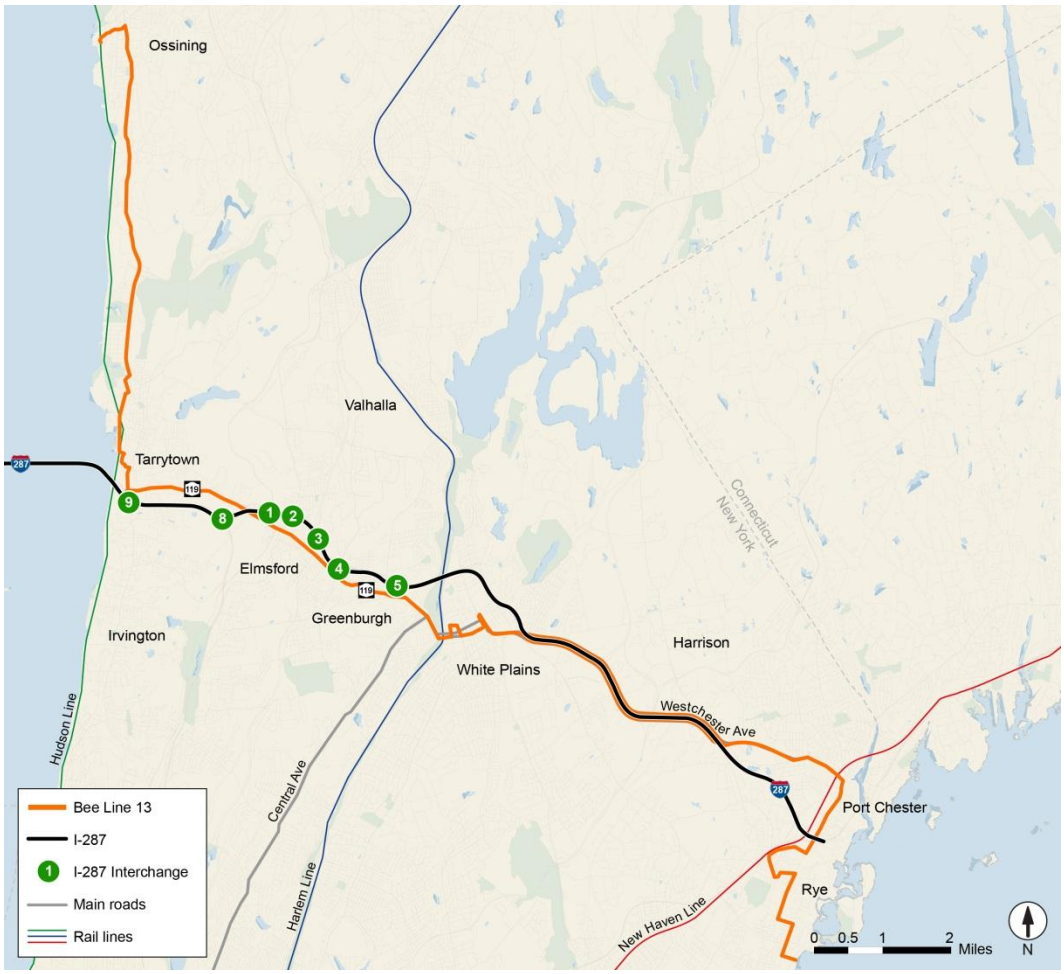

Figure 12: Bee-Line route 13

According to DPW&T, the Bee-Line carried 32.1 million passengers in 2012. The highest daily ridership is along the Central Avenue corridor (routes 20/ 21) which serves communities between White Plains and Yonkers with continuing service to the New York City Subway in the Bronx. More information on all non-rail public transit in Westchester County can be found in Appendix C.

5.2.3 MTA Metro-North Railroad

Below is a brief overview of the commuter rail lines which fall within the corridor. More information on MNR can be found in Appendix C.

West-of-Hudson

Port Jervis Line (Main/Bergen Lines)

The Port Jervis Line runs from Port Jervis in western Orange County to Hoboken, NJ using NJT's Main/Bergen Lines between Suffern and Hoboken with connecting service to New York Penn Station (NYP) at Secaucus Junction. This MNR line carried approximately 1 million passengers in 2012. The Suffern MNR station is served by TOR and TZx buses.

Pascack Valley Line

The Pascack Valley Line originates in Spring Valley and terminates in Hoboken, with a connection to NYP at Secaucus Junction. While this line has the fewest riders in the MNR system – roughly 600,000 annually – ridership has increased dramatically in the last seven years as service has improved due to infrastructure investments (passing sidings) and schedule improvements. Spring Valley Transit Center is served by TOR and TZx buses. TOR buses serve Nanuet and Pearl River Stations, the other two Pascack Valley Line stations in Rockland County.

East-of-Hudson

Hudson Line

The Hudson Line originates at Poughkeepsie in Dutchess County and terminates at Grand Central Terminal (GCT) in Manhattan. According to a 2012 report, this line has the lowest ridership of the three East-of-Hudson lines, with approximately 15.8 million riders annually. For commuters from Rockland and points west of the Hudson River, Tarrytown Station on the Hudson Line is the westernmost place to access MNR service in Westchester. The TZx service stops at Tarrytown Station to allow passengers to connect to the train.

Harlem Line

The Harlem Line originates at Wassaic Station in Dutchess County and terminates at GCT in Manhattan. This line carried 26.6 million passengers in 2012, which is the second highest ridership in the MNR system. White Plains Station on the Harlem Line is directly adjacent to the White Plains TransCenter, which is a hub for both local and regional bus services, including TZx.

New Haven Line

The New Haven Line runs through the eastern end of the I-287 corridor study area. The service originates in downtown New Haven, Connecticut, and terminates at GCT. This line carried 38.8 million passengers in 2012 which makes it not only the highest volume line in the MNR system, but also the largest commuter railroad in the country (in terms of ridership miles). According to MNR, the New Haven Line also accommodates the largest reverse commuter market in the country, due to several large employment centers in southeastern Connecticut, including Stamford, Bridgeport, and New Haven. The primary New Haven Line station in the study area is located in downtown Port Chester.

5.3 Roadway Network

The region's existing roadway network was looked at to better understand current physical conditions, operational characteristics, and traffic volumes and their effect on transit running times and the overall effectiveness of the proposed service. Roads on which the proposed BRT system will operate were of particular interest. These include:

- I-287 from Interchange 15 in the west to Interchange 12 in the east. As one of three major east/west Interstates connecting Pennsylvania/New York/New Jersey to New England, I-287 is a key route for regional transportation and freight movement. The closest similar east/west Interstate, I-84, is located approximately 30 miles to the north.
- State Route 59 from Suffern in the west to Nyack in the east
- Route 119 from Tarrytown in the west to White Plains in the east
- Central Avenue/Route 100 from White Plains to the Westchester/Bronx border

A map of these roadways can be seen below. (See Figure 13.) More information on each can be found in Appendix C.

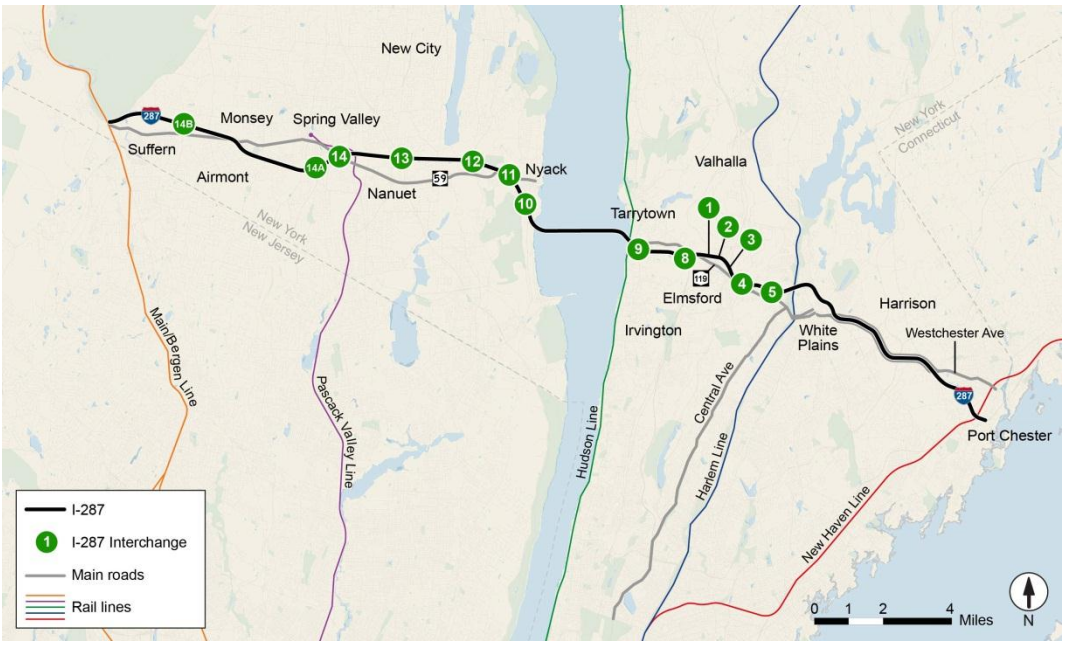

Figure 13: I-287 corridor in Rockland and Westchester Counties

Traffic conditions on these roads are influenced by auto and truck demand and the interaction of the various physical elements of the roadway system, including the number of travel and turn lanes, the type of traffic control devices used, the spacing of interchange ramps and at-grade intersections, the geometric design of the roadways, and vertical grades. All of these elements affect how drivers interact and influence how congestion and queuing builds and dissipates throughout the day. More information on traffic conditions in the region can be found in Appendix C.

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6 Travel Needs in the Region

This section focuses on the region's short-term transit needs, since the bulk of the MTTF transit recommendations focus on this timeframe.

The short-term travel needs in the region can be framed with a few key questions:

- What are the major travel markets in the region? Who are the user groups? What are their specific needs?
- How does travel demand along the I-287 corridor factor into the overall travel picture in the Lower Hudson Valley?
- What are the specific origin and destination markets served along the I-287 corridor, and what is the travel demand by mode in each market?
- What are the travel options in each market, and how does each mode perform from a travel time perspective?
- In what markets would transit be competitive compared to auto travel?
- What is the best service design to maximize productivity?

6.1 Challenges and Opportunities in Transit System Design

The reason for designing and implementing an enhanced transit solution along the I-287 corridor is to improve transit access to local and regional destinations, encourage transit use, and reduce traffic on I-287 and parallel and connecting roadways with a goal of reducing overall congestion in the corridor. An efficient and attractive transit solution is required to accomplish this goal. The solution should be high-capacity and feature various time-saving priority measures to make it competitive with auto travel. The system must also respond to existing and future demand between major travel markets in the region by providing service where people want to go. In doing so, people will want to use the system for everyday travel which, in turn, will create a more productive transit system that decreases operational subsidies.

There are challenges to designing and implementing an efficient, attractive, and productive system along the I-287 corridor. For example, dispersed land uses and abundant free parking make auto travel a very efficient and convenient way to get around the region.

Secondly, travel demand to New York City is served by existing rail and bus options on either side of the river. From Rockland, the Pascack Valley and Main/Bergen Lines provide service to Penn Station via a transfer at

Secaucus Junction or a transfer to Port Authority Trans Hudson (PATH) trains in Hoboken, and several private coach operators provide one-seat bus service to Manhattan. From Westchester, the MNR Harlem, Hudson, and New Haven Lines provide convenient access to GCT.

Lastly, there are many causes of congestion along the I-287 corridor. Grade changes, a reduction in travel lanes ("bottlenecking"), closely spaced interchange ramps, interchange design, and high vehicle demand all contribute to congestion on both sides of the bridge.

Despite these challenges, various strengths along the corridor can be leveraged to design an efficient and productive transit system. Some clear opportunities have been identified by the MTTF.

Opportunity 1: *The work travel market from Rockland to Westchester is larger than Rockland to Manhattan.*

- The New York Metropolitan Transportation Council's (NYMTC) Regional Household Travel Survey (RHTS), released in 2013, provides a comprehensive assessment of regional travel patterns. The RHTS data indicate that there are 13,681 work trips from Rockland to Westchester, while there are 12,888 to Manhattan. Providing more convenient and regular transit service to Westchester could unlock an underserved regional travel market.

Opportunity 2: *White Plains and Yonkers represent the two largest work destinations in Westchester for Rockland residents.*

- RHTS data indicate that White Plains and Yonkers have the greatest concentration of employment destinations for Rockland workers, with approximately 1,900 and 1,500 work trips, respectively. Valhalla and Elmsford are in a second tier, with over 900. Tarrytown, Port Chester, and other areas to the south of I-287 are in the 400 to 600 range. Focusing bus service on the major concentrations of work destinations in White Plains and Yonkers would provide new opportunities to generate ridership.

Opportunity 3: *The majority of all trips along the corridor are intra-county.*

- Both the RHTS and the U.S. Census Longitudinal Employment Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) dataset indicate that the majority of travel in each county is within the county. Approximately 90 percent of all travel and 60 percent of work travel is done entirely within Rockland or Westchester Counties. Providing faster and more convenient transit service along the I-287 corridor – particularly within the Counties – could help attract more riders and reduce intra-county auto travel.

6.2 Major Travel Markets

Travel demand in the corridor is driven by demographics and economic activity. The broadest measures of economic activity include population, employment, and household income. The MTTF used the County totals for these elements for 2010 and 2030 from the U.S. Census and NYMTC's Social Economic Demographic (SED) forecasts. (See Table 3 for the County totals.)

Table 3: County population and employment totals

	Rockland			Westchester		
	2010	2030	% Growth	2010	2030	% Growth
Population	311,687	333,500	7%	949,113	1,065,300	12%
Employment	155,229	191,900	24%	493,154	712,700	45%
Median Household Income	$86,020	n/a	n/a	$81,093	n/a	n/a

Source: US Census, NYMTC

In general, Westchester has three times the population and employment of Rockland. NYMTC's forecasts indicate that the population relationship will remain stable in the future.

The RHTS calculates county-to-county travel flows for all trip purposes (e.g., work, shopping, education, etc.) and work trips only. (See Table 4 and Table 5.) The RHTS trip information represents the ultimate origin and destination of a trip. Intermediate stops along the "trip tour" are not reflected in these data.

Table 4: **RHTS County-to-County Flows – All Trip Purposes**. Intra-county trips are in orange. "Other" includes Putnam and Nassau Counties in New York and Hudson County in New Jersey.

From (row) To (column)	Rockland	Westchester	Manhattan	Bronx	Other NYC	Bergen	Other
Rockland	796,128	20,533	17,650	5,869	4,192	21,546	3,388
Westchester	4,972	2,207,221	111,120	52,088	31,508	559	17,945
Manhattan	3,241	8,273	3,939,018	68,760	79,241	7,980	19,959
Bronx	1,764	65,250	341,210	2,475,192	76,751	5,349	3,912
Other NYC	878	24,402	1,073,182	38,423	9,885,025	7,846	215,815
Bergen	28,809	52,137	72,997	13,134	11,684	2,559,170	25,698
Other	1,405	56,013	225,920	8,960	166,463	48,552	4,741,401

Table 5: **RHTS County-to-County Flows – Work Trips**. Intra-county trips are highlighted in yellow, while trips to Rockland/Westchester and Manhattan are highlighted in orange. "Other" includes Putnam and Nassau Counties in New York and Hudson County in New Jersey.

From (row) To (column)	Rockland	Westchester	Manhattan	Bronx	Other NYC	Bergen	Other
Rockland	67,603	13,681	12,888	4,618	4,192	6,684	1,548
Westchester	1,813	197,685	78,983	34,073	23,169	224	5,119
Manhattan	1,500	3,381	680,797	22,732	31,602	4,872	14,930
Bronx	38	22,009	159,123	173,900	56,562	2,359	3,662
Other NYC	878	19,347	722,945	23,529	921,011	6,017	78,698
Bergen	5,577	5,816	51,120	10,751	7,616	227,693	18,643
Other	414	28,002	173,217	7,532	94,951	24,518	405,518

What can be gleaned from the data is that the majority of trips (work trips and all trips) take place within each county. (See Figure 14 and Figure 15 for key regional destinations for work travel to/from Rockland and Westchester Counties.)

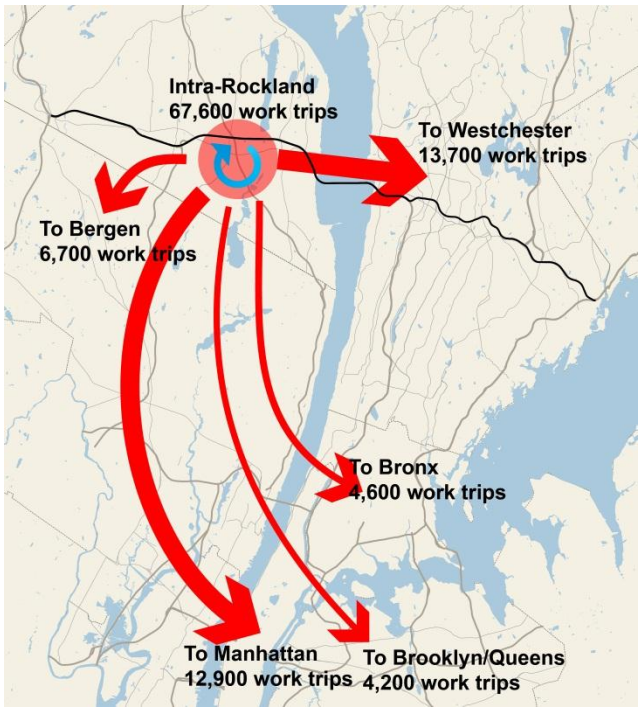

Figure 14: Work Travel Destinations for Rockland. Source: RHTS

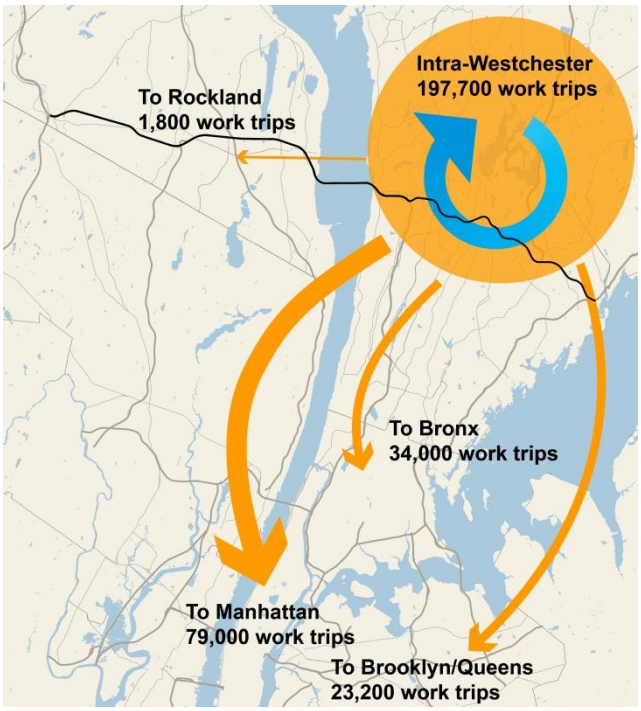

Figure 15: Work Travel Destinations for Westchester. Source: RHTS

Rockland-to-Westchester work travel generally moves across the TZB and towards large concentrations of jobs in White Plains, Yonkers, and Valhalla. (Figure 16 illustrates how work travel flows with a Rockland origin and a Westchester destination.)

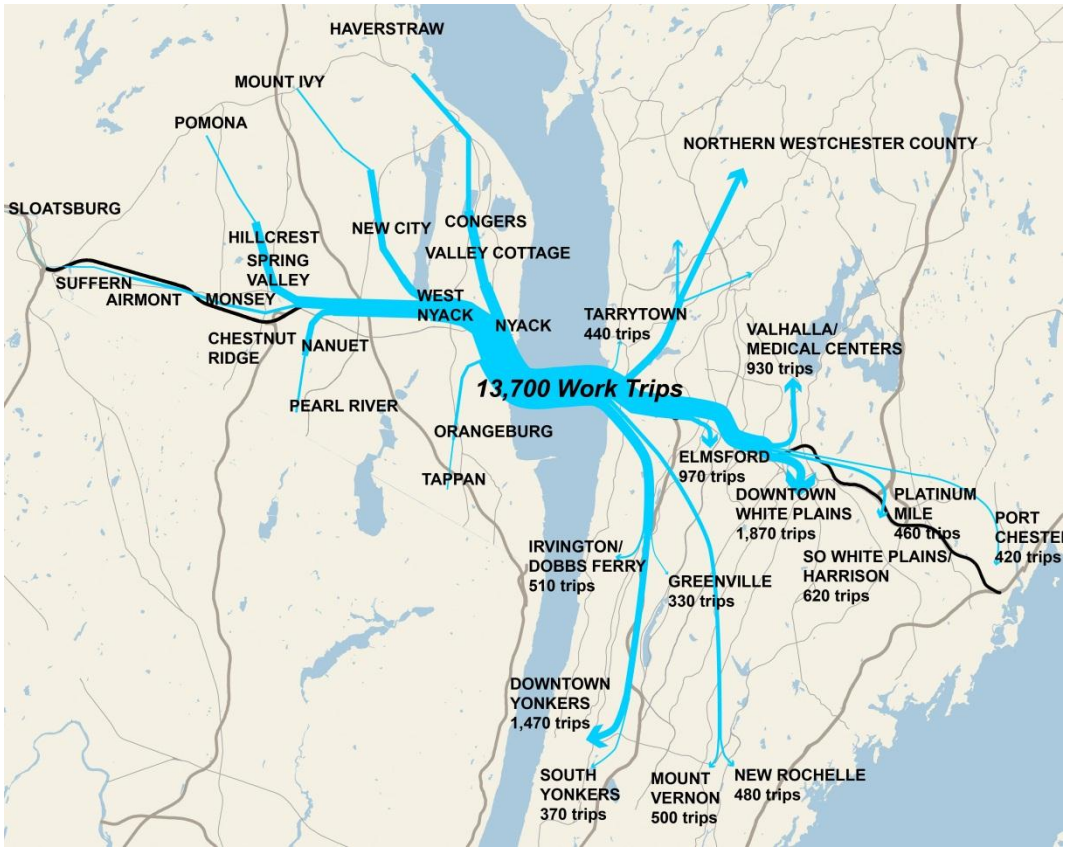

Figure 16: Rockland to Westchester work travel flows (Source: RHTS)

These data highlight the general travel patterns within the region:

- Intra-county travel represents the highest share of work trips in both counties.
- There are more Rockland-to-Westchester work trips (13,700) than Rockland-to-Manhattan work trips (12,900) per the RHTS.
- Westchester-to-Rockland work travel is a very small proportion of overall travel originating from Westchester County.

The RHTS data were used to summarize auto, bus, and rail mode shares for county-to-county work travel. (See Table 6 for mode shares for travel from Rockland and Westchester Counties.)

Table 6: County-to-County Mode Shares from Rockland and Westchester Counties

Work Mode Share (%)	Auto	Bus	Rail/Ferry
Rockland to:			
Rockland	93%	4%	0%
Westchester	98%	2%	0%
Manhattan	36%	28%	36%
Westchester to:			
Rockland	100%	0%	0%
Westchester	96%	4%	0%
Manhattan	18%	3%	79%
Source: RHTS			

In the following sections, each county is analyzed in further detail using the LEHD data.

6.2.1 Rockland Travel Analysis

The LEHD LODES dataset provides information on where workers live and their place of employment. This dataset represents an estimate of work trips and provides more geographic detail than the RHTS on the specific location of workplaces. To better assess specific origin and destination pairs for Rockland residents, the LEHD data were analyzed at a more detailed level. The major origins and destinations for Rockland residents are summarized in greater detail, with a specific focus on the Rockland-to-Westchester and the Rockland-to-Manhattan travel markets.

The LEHD work trip data was used to identify the major work origin and trip destinations for Rockland County residents. These origins can be aggregated and evaluated based on their level of transit accessibility:

- **Central County (2,260):** Nanuet (800), Hillcrest (760), Spring Valley (700). These areas are in close proximity to stations along the Pascack Valley Line, which makes MNR service and private coach buses the most attractive transit options to Manhattan.
- **New City and Bardonia (1,890):** New City (1,550) and Bardonia/West Nyack (340). This is a large geographic area between the Palisades Parkway and Lake DeForest just north of I-287/87. This area does not have convenient access to transit. The

best transit option is likely driving to Spring Valley or Nanuet and boarding a private coach bus or a Pascack Valley Line train.

- **East County (1,390):** Valley Cottage (720), Nyack (360), Upper Nyack (140), South Nyack (170). This area includes Nyack and areas to the north between the Hudson River and Lake DeForest. In this sub-area, Hudson Line service via TZx to Manhattan is more competitive compared to West-of-Hudson transit options. Private coach service is also available.
- **West County (1,220):** Airmont (440), Suffern (400), and Monsey (380). This is the smallest of the sub-areas around I-287/87 and has convenient access to both the Main/Bergen and Pascack Valley Lines. Using TZx from this area in western Rockland County is not competitive to Manhattan when compared to existing rail or private coach bus services.

Communities directly adjacent to I-287/87 in Rockland County generate about one-third of all work trips originating in the County. (See Figure 17 for the total work trip origins for Rockland residents, aggregated by Census place.)

In Westchester, the greatest concentration of work destinations for Rockland residents is located in White Plains, Yonkers, and Valhalla. Elmsford and Harrison, both located along the I-287 corridor, have smaller concentrations of work destinations. (See Figure 18 for the Westchester work destinations for Rockland residents, aggregated by Census place.)

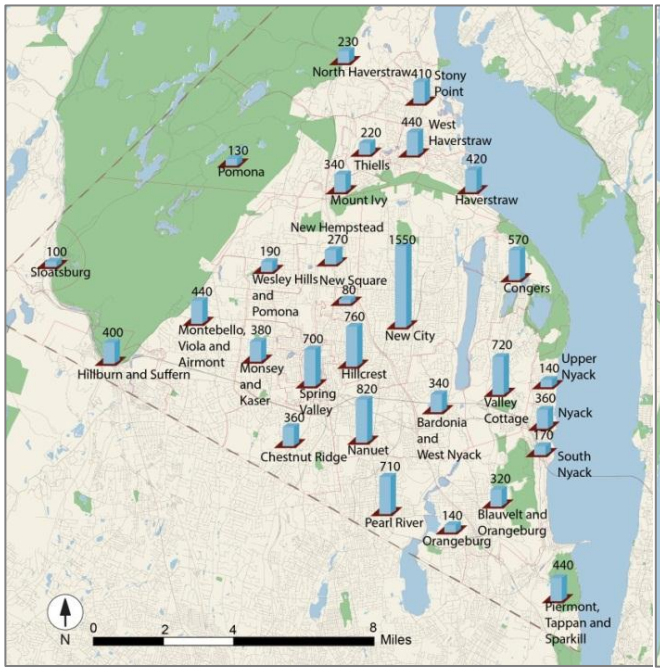

Figure 17: All Work Trip Origins – Rockland Residents (Source: LEHD)

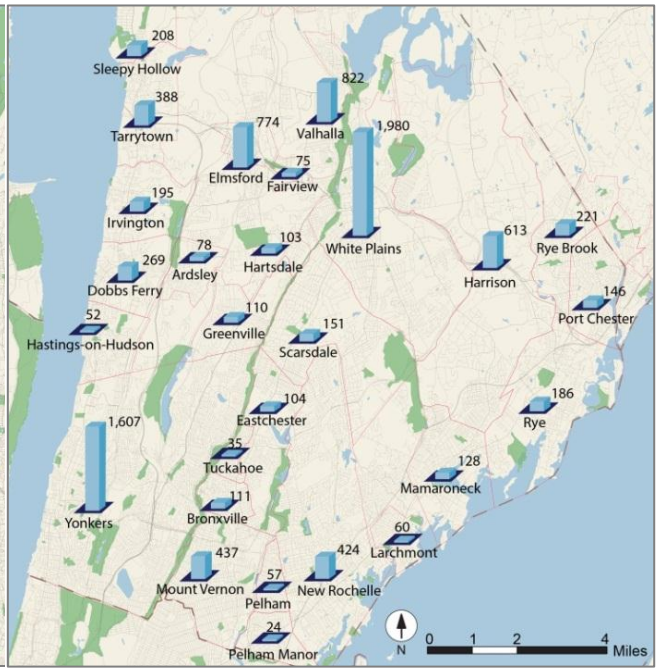

Figure 18: Work Trip Destinations in Westchester County for Rockland Residents (Source: LEHD)

The majority of work travel for Rockland residents is within Rockland County, and the I-287/87 corridor in particular is home to key employment, educational, and institutional destinations. (See Figure 19 for additional detail on the work destinations for Rockland residents along the I-287/87 corridor.)

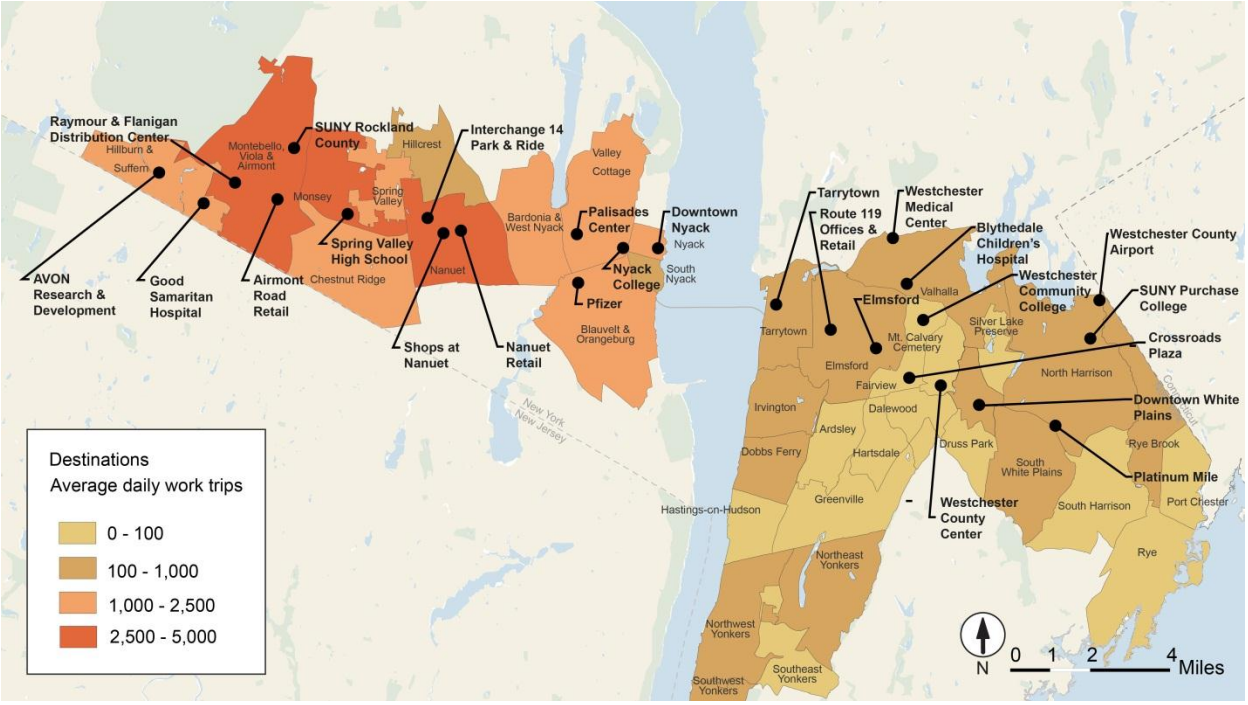

Figure 19: Destinations for all Rockland-based work trips along the I-287 Corridor (Source: LEHD)

6.2.2 Westchester Travel Analysis

The LEHD data were analyzed to assess work travel patterns within Westchester County. Most of the existing work travel for Westchester residents is intra-county or to Manhattan, with travel to Rockland representing only a small percentage of trips (less than 1 percent). (See Figure 20 for major work destinations from origins within Westchester County.) The Manhattan market is not a focus of this analysis because these trips are not served across the I-287 corridor.

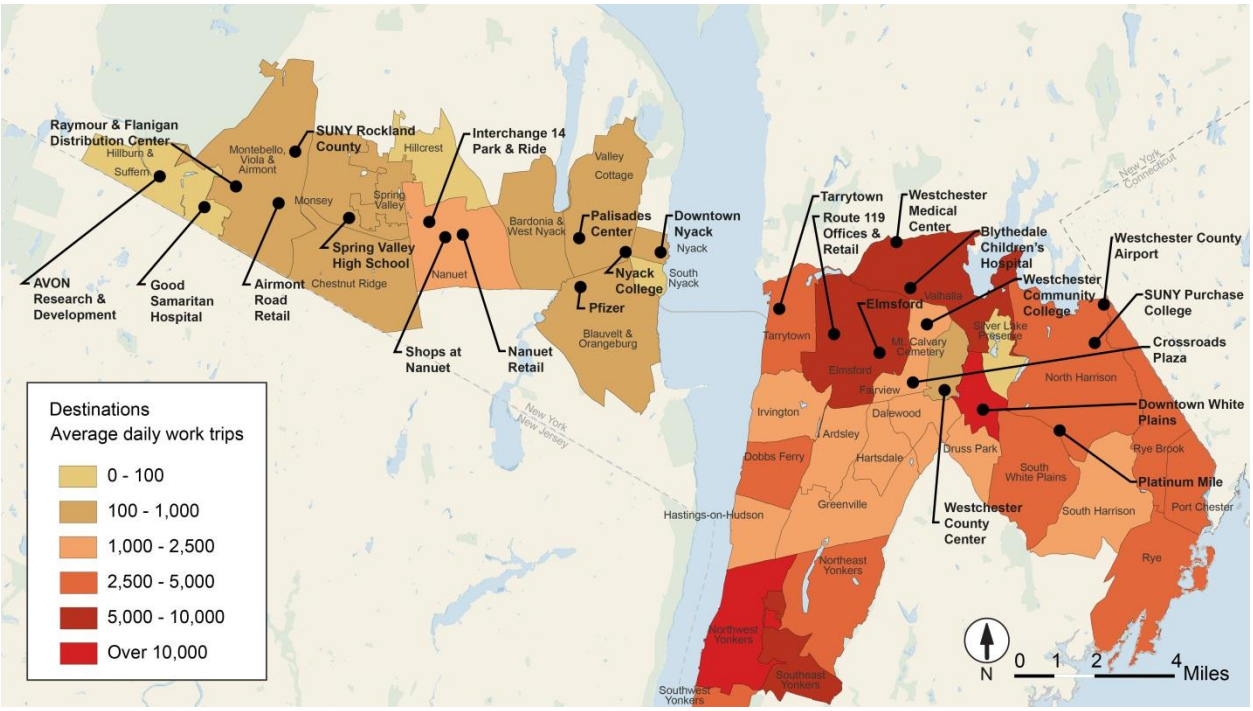

Figure 20: Destinations for all Westchester-based work trips along the I-287 Corridor (Source: LEHD)

Two major intra-Westchester work travel markets, north-south and east-west, offer an opportunity for generating significant transit ridership. The north-south market, focusing on downtown White Plains, Valhalla, and the Platinum Mile, has approximately 13,000 work trips. (See Figure 21 for major intra-Westchester work travel flows to the I-287 corridor.)

The east-west work travel market, which consists of communities along the I-287 corridor, has approximately 6,000 trips. Almost half of these trips – approximately 2,800 – have a destination in downtown White Plains.

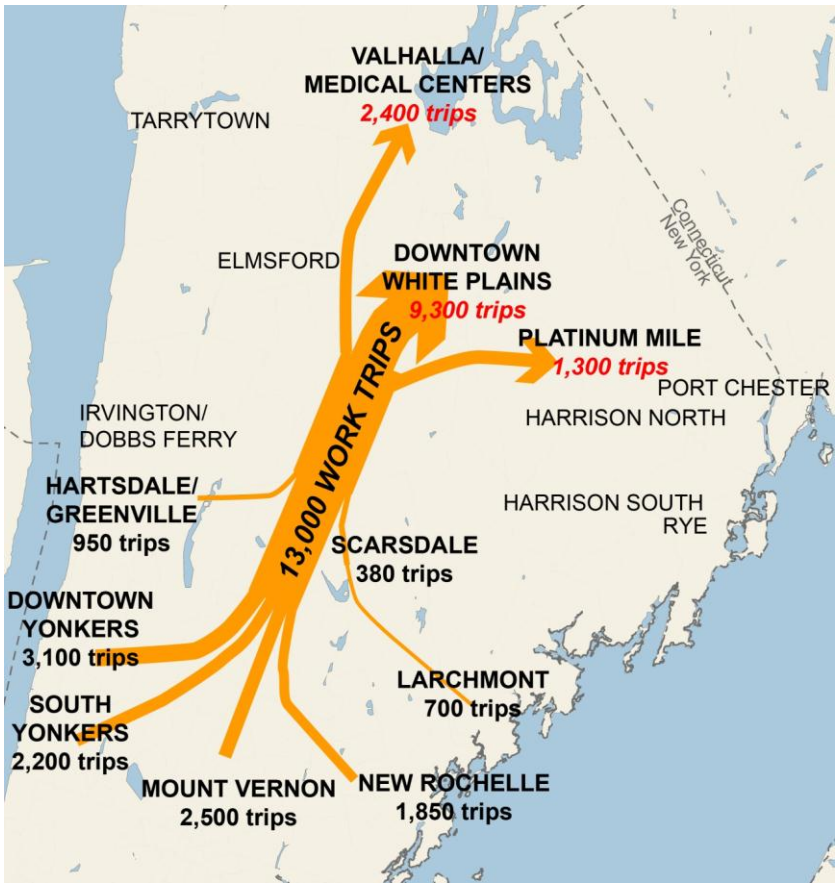

Figure 21: Major intra-Westchester work travel markets (Source: LEHD)

6.3 Comparison of Transit Options: Rockland County to New York City

To better understand transit demand in Rockland County, existing transit options were investigated. (See Figure 22 for existing transit options to New York City from three origins representing the west, central, and east portions of Rockland County.)

The fastest transit trip to Manhattan from the western and central portions of the County is via the Main/Bergen and Pascack Valley Lines, respectively, which serve Manhattan via Secaucus Junction or Hoboken. (Scheduled travel times are shown in Appendix C.) Using the TZB to access Manhattan via the Hudson or Harlem Lines in Westchester County is a less attractive option for most commuters living in western or central Rockland because of increased travel times and congestion along the corridor. Nyack, Valley Cottage, and Congers are a few areas within the County where traveling to Westchester to board Hudson or Harlem Line trains is an attractive transit option given the lack of existing north-south rail in the eastern portion of Rockland County.

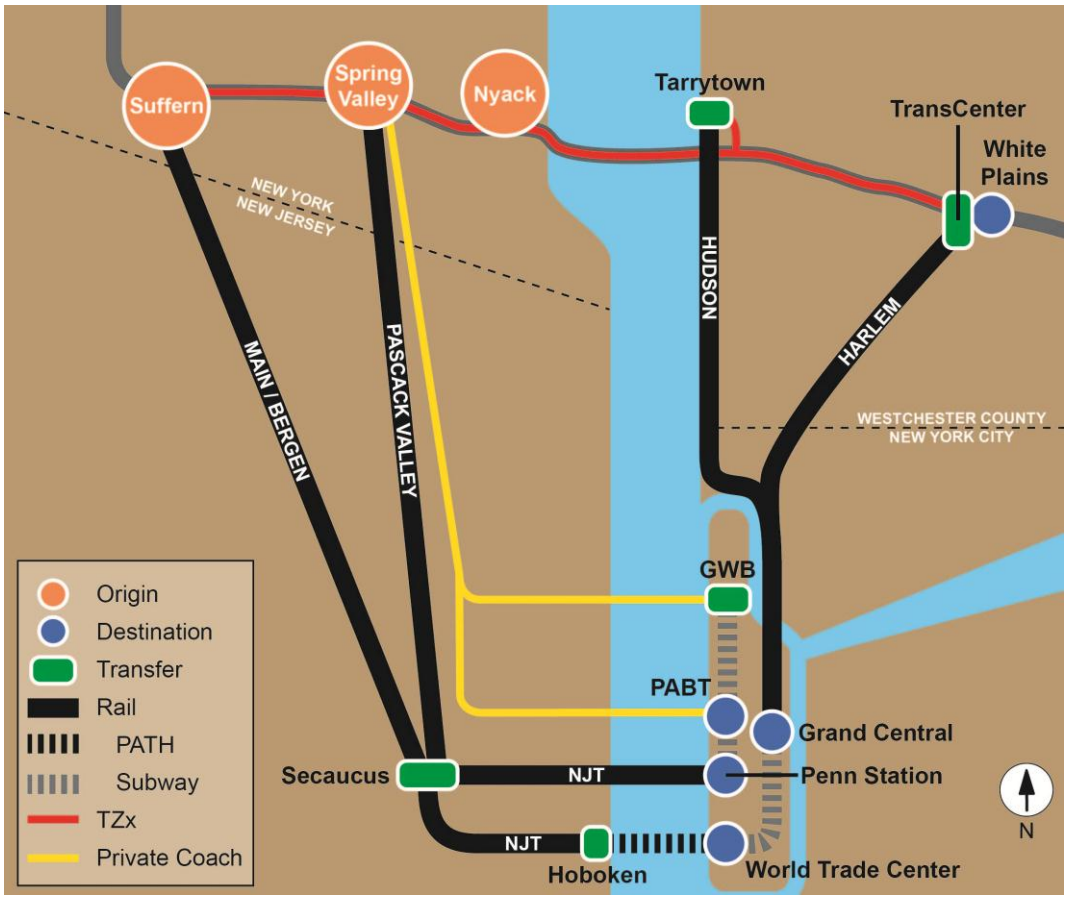

Figure 22: Existing transit options from Rockland origins to White Plains and New York City

Rockland-to-Manhattan work travel data from RHTS was segmented by mode to better understand how travel choice affects the total number of commuters.

Bus (Private Coach) = 36%

- 4,661 commuters

Train = 28%

- 450 commuters use TZx and transfer to Hudson or Harlem Lines.
- 532 commuters drive to Tarrytown and transfer to the Hudson Line.
- 108 commuters take the ferry from Haverstraw to Ossining and transfer to the Hudson Line.
- 1,060 commuters take the Main/Bergen or Pascack Valley Lines.
- 1,493 commuters drive to New Jersey and transfer to train or ferry.
- 3,643 total rail commuters

Auto Only = 36%

- 4,584 commuters

Existing travel options from Westchester to Manhattan were not considered here because the transit mode share is approximately 80 percent rail and is expected to remain unchanged. Such a high rail mode share is due to the County being well-served by three MNR lines to GCT. No additional analysis is required.

6.4 Transit Needs Summary

The following summarizes key findings from the transit needs assessment.

- The relatively small population of Rockland County does not generate enough overall transit demand.
- West-of-Hudson transit options to New York City, which include private coach buses and the Main/Bergen and Pascack Valley rail options, provide a faster ride for a majority of Rockland residents when compared to a transit trip consisting of TZx with a Hudson or Harlem Line train.
- For areas of Rockland County such as Nyack, Congers, and Valley Cottage, a TZx–Hudson/Harlem Line combination offers a more competitive trip option to New York City than other West-of-Hudson options. However, this origin market is relatively small compared to central Rockland.
- Tarrytown serves primarily as a transfer point to MNR. There are a very small number of Rockland workers commuting to jobs in Tarrytown.
- The Hudson and Harlem Lines are attractive for commuters working around GCT or requiring a connection to a subway line at GCT.
- The Rockland-to-Westchester travel demand for work trips and all trips is greater than the Rockland-to-Manhattan travel demand.
- The work travel market from Rockland origins to Westchester destinations in White Plains and Yonkers is currently underserved. This presents an opportunity to capture additional work travel.
- The increasing concentration of workplace locations in downtown White Plains provides more opportunities to capture work trips.

7 Mass Transit Task Force Transit Recommendations Timeframes

The MTTF was tasked with developing fiscally-viable and prioritized sets of short-, mid-, and long-term transit recommendations. These timeframes are characterized as follows:

- **Short-term** has been defined as the time between adjournment of the MTTF through the opening of the NNYB in 2018. The MTTF acknowledges that the scope of short-term projects is finite. Realistically, only so much can be done by 2018. Therefore, projects requiring complex environmental study were limited or moved to the mid- or long-term.
- **Mid-term** has been defined as up to 15 years beyond opening of the NNYB.
- **Long-term** has been defined as over 15 years beyond opening of the NNYB.

7.1 Short-Term Transit Recommendations

7.1.1 Introduction

The MTTF considered four primary transit modes: BRT, commuter rail transit (CRT), light rail transit (LRT), and monorail. All modes could serve travel needs in the corridor. However, the MTTF determined early on that BRT was the most appropriate mode for the region given the potential transit market, lower capital and operating costs, operational flexibility, and the ability to have a system in place in time for the NNYB opening in 2018. That decision served as the foundation for development of the transit recommendations.

BRT is bus transit that looks, feels, and operates like rail-based modes with modern, comfortable vehicles, large stations (featuring weather protection, seating, ticket vending machines, and other passenger amenities), limited stops, simple routing, and priority signaling to speed trips. Like rail modes, BRT is fast, reliable, and high-capacity. However, because it runs on streets, BRT is flexible and has infrastructure costs that are significantly lower than rail. As ridership expands and regional transit demand increases, BRT can also serve as a foundation for expansion to other modes, including rail.

In the region, BRT would connect residential areas and activity nodes in both Westchester and Rockland Counties. The system is intended to be seamless, offering a single, branded identity, a uniform fare payment system, and connections to existing bus and rail systems on both sides of the Hudson River. Bi-directional, all-day service would be provided with

high-quality passenger amenities. Stations would include branded shelters with system maps, real-time bus arrival information, ticket vending machines for pre-board fare payment, seating, lighting, and public art. Vehicles would be modern, comfortable, and bright and equipped with Wi-Fi. Along each route, where possible and needed, transit priority measures such as transit signal priority (TSP), transit lanes, and queue jumps lanes are recommended. The proposed system will operate on I-287 (including the extra wide shoulders of the NNYB), Route 59 in Rockland, Route 119, Westchester Avenue, and Central Avenue in addition to some local roads.

The proposal includes a system of seven new BRT routes in Rockland and Westchester Counties along with a package of infrastructure enhancements to increase transit speeds and improve schedule reliability. The recommended short-term BRT routes respond to existing travel needs and will serve as a foundation for future system growth.

Proposed Transit Network

- 7 routes (See Figure 23)
    - 3 intercounty routes connecting Rockland and Westchester Counties. These routes include intra-Rockland segments.
    - 3 intra-county routes connecting destinations in Westchester.
    - 1 route connecting Westchester County to the Bronx.
- The proposed system will serve key east/west travel markets between the two counties.
- Serving more than just MNR commuters, the proposed regional BRT system will provide connections to key regional destinations, including White Plains, Westchester Medical Center, the Palisades Center, downtown Nyack, the Platinum Mile, Empire City Casino, The Shops at Nanuet, downtown Suffern, and Westchester County Airport.
- Riders will be able to utilize a unified fare payment system, system-wide.
- Connections will be provided to existing transit, including all five MNR rail lines and the New York City Subway System.
- The system anticipates a refurbished White Plains TransCenter, to be studied and planned through a $1 million grant awarded to the City of White Plains by the Mid-Hudson Regional Economic Development Council.

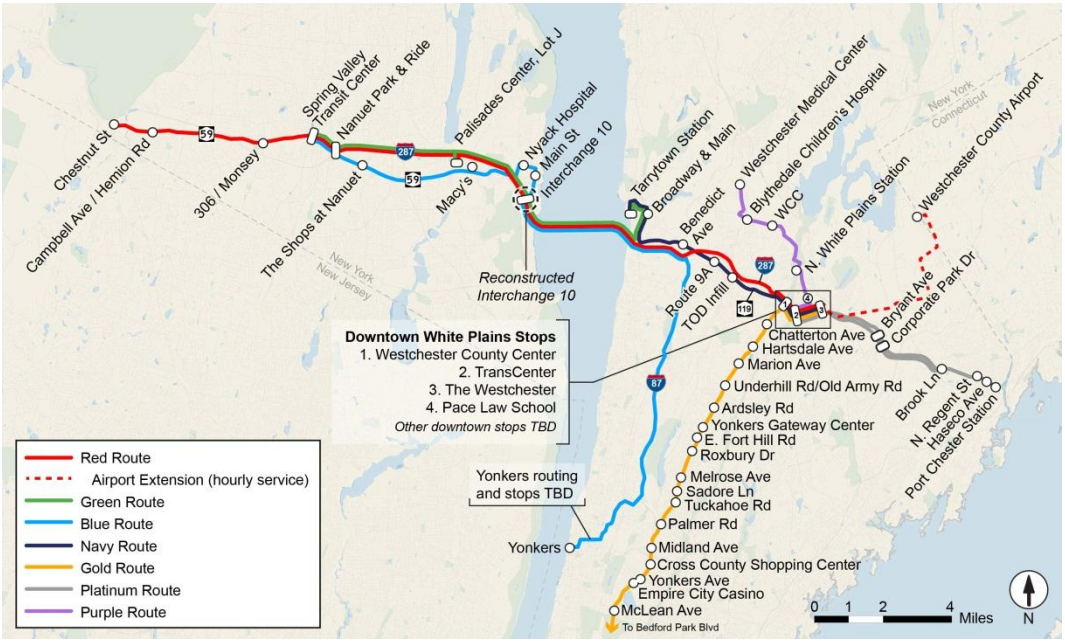

Figure 23: Proposed short-term regional BRT network with recommended stops

7.1.2 Development of the Transit Proposal

The starting point for the MTTF's transit evaluation was the work done over the past ten years to develop a preferred transit option to accompany the rebuilding of the TZB. While this work served as a foundation, the diverse membership of the MTTF offered many new ideas about serving travel needs in the region. The prior planning efforts coupled with new ideas from MTTF members and delegates produced a long list of options that can be grouped into the following categories:

- County-level transit enhancements
- I-287 BRT
- I-287 LRT
- I-287 CRT
- I-287 CRT to GCT
- West-of-Hudson rail service improvements
- Monorail
- Ferry

Over time this list was winnowed to a preferred set of options. In identifying preferred options, the MTTF considered many issues, using the following key selection criteria:

- user friendliness
- land use compatibility
- connectivity with existing systems
- alignment with existing travel markets
- alignment with future growth plans
- ridership potential
- local area impacts
- capital and operating costs
- ease of implementation
- timeline for implementation

These criteria helped the MTTF determine that BRT is the most appropriate transit mode for the region.

7.1.2.1 Transit Service Objectives and Design Guidelines

With BRT as the selected mode, service objectives and design guidelines were established to develop and refine the MTTF transit proposal.

Short-Term Transit Objectives

Create a competitive transit system that features:

- simplicity and legibility
- connections to key origins and destinations
- attractive service frequencies at regular intervals
- faster speeds
- branded service

Design an effective and efficient transit service:

- strengthen intra-county and inter-county connectivity
- strengthen connectivity to Manhattan and across the region
- integrate services with land uses

- ensure physical and institutional integration of transit services throughout the region
- create reasonable expectations of the cost and benefit of capital projects.

System Design Guidelines

A set of design guidelines was established to inform development of the short-term transit proposal. These guidelines served as standards that, if met, would serve to optimize the system, enhance regional accessibility and transit reliability, decrease travel times, improve passenger amenity, and increase ridership.

Transit design guidelines include:

- service to major destinations: White Plains, Nanuet/Spring Valley, Palisades Center, the Platinum Mile, existing transit hubs, among others
- limited stops to speed up service
- headway-based scheduling (ideally in 15-minute increments)
- branded, integrated service
- use of extra wide shoulders on the NNYB
- targeted, proven transit priority mechanisms including bus lanes and TSP
- improved stations: high-quality shelters with seating, lighting, signage, real-time bus arrival information, off-board fare payment, all-door boarding, bike parking, and public art

7.1.3 BRT System Overview

The BRT system recommended by the MTTF would be a single, regional network with a uniform identity that will be easily recognizable by riders. The system will serve both counties and feature one means of ticketing so that riders can travel easily between counties and throughout the Lower Hudson Valley without having to buy multiple tickets for different transit systems. The system would conveniently connect major concentrations of residential, employment, commercial, entertainment, medical, and educational land uses. The proposed system also provides key connections to existing bus (TOR and Bee-Line) and rail (MNR) systems.

The proposal includes three BRT routes with both intra-Rockland and intercounty connections, three intra-county routes in Westchester, and one route connecting Westchester County to the Bronx. While the destinations

vary, most routes will converge at the White Plains TransCenter, allowing timed transfers between BRT and local bus routes and Metro-North.

All stations will offer comfortable, protected waiting environments with seating, real-time bus arrival information, a system map, bike and car parking (where appropriate and space allows), and convenient connections to local destinations. (See Figure 24 and Figure 25.) Stations will also feature ticket vending machines which allow riders to purchase tickets before the bus arrives. (See Figure 26.) Often called “pre-board fare collection,” this makes boarding faster because riders don’t have to fumble for change and pay when they board the bus. This allows buses to spend less time at stations and more time on the move. The fare payment system will be uniform across all routes, allowing boarding and alighting in both Rockland and Westchester Counties so that users throughout the region can access the system wherever it serves.

BRT vehicles will offer a high-quality, comfortable ride experience and are recommended to be equipped with Wi-Fi.

Lastly, the BRT system will be branded to offer a customized, uniform experience for all users that is easily recognizable and enjoyable.

Figure 24: Suburban BRT station on the Swift system in Snohomish County, WA. (Source: Chad Solomon)

Figure 25: Urban BRT station on the HealthLine in Cleveland, OH. (Source: tracktwentynice, Creative Commons)

Figure 26: Ticket vending machine for pre-board fare payment on the Cleveland HealthLine. (Source: ITDP, Creative Commons)

7.1.3.1 New BRT Stations and Vehicles

Figure 27: BRT stations like this one in Las Vegas will offer ticket vending machines, travel information, and a comfortable waiting environment. (Source: Time Anchor, Creative Commons)

What is it?

High-quality bus stations with amenities will improve the experience for all riders. It is recommended that stations offer comfortable, well-lit, weather-protected waiting environments with seating, real-time bus arrival information, a system map, and bike and car parking (where appropriate and space allows). Stations should also have safe and convenient pedestrian connections to local destinations. Fares will be collected at ticket vending machines before the buses arrive to avoid delays associated with having to pay a fare upon boarding the bus. New BRT vehicles will offer a high-quality, comfortable ride and will be equipped with amenities such as Wi-Fi. They should be able to operate on both local roads and highways. The entire BRT system will be uniquely branded to visually differentiate it from regular local buses. Station and vehicle branding will help make the new service recognizable and attractive.

Figure 28: BRT buses and stations are low-floor for easy boarding and branded to be attractive and easy to recognize. The bus shown is from the Emerald Express (EmX) system in Eugene, OR. (Source: Mark David, Creative Commons)

Where will it go?

It is recommended that all new, high-quality buses and stations be rolled out along all proposed routes.

Why is this important?

To create an easily identifiable system, improve the passenger experience both on buses and at waiting areas, and attract new riders to the system.

Review of Transit Facilities Currently Under Rehabilitation or Redesign

Along each proposed route, it will be important to review ongoing work in existing project pipelines to determine how projects could potentially align with the proposed BRT system. For instance, existing bus stop or park and ride improvements could be assessed to establish whether or not the work complements or constrains proposed BRT improvements. It would be counterproductive to undertake improvements to current systems only to have to retrofit the work done to fit the BRT system.

Integrating current work projects into the proposed BRT system throughout the implementation process could produce tangible benefits as well as cost savings.

7.1.4 Routing

The short-term transit proposal includes seven new regional BRT routes.

- Three are inter-county (trans-Hudson) routes with intra-Rockland connections.
- Three are intra-Westchester routes.
- One additional route connects Westchester County to the Bronx via Central Avenue/Route 100.

The proposed BRT system represents a full regional network with service in both counties as well as the Bronx. “Regional,” in this context, refers to transit routes that cross political boundaries to serve different destinations in different parts of the region. The only existing transit route that does this in the I-287 corridor is the TZx. With the proposed system, passengers can travel throughout the Lower Hudson Valley using a single transit system with a uniform identity and means of fare payment. (See Figure 29 and Figure 30 to compare the existing regional bus system to the proposed regional BRT system.)

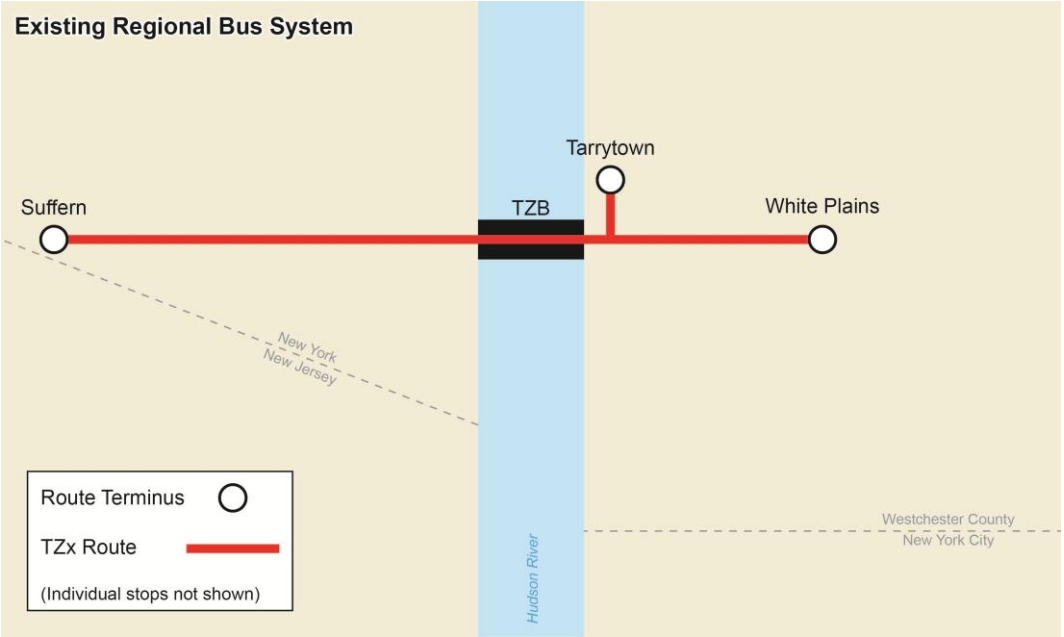

Figure 29: The region's existing regional bus system – the TAPPAN ZEExpress (TZx) – runs between communities in Rockland County and Tarrytown and White Plains in Westchester.

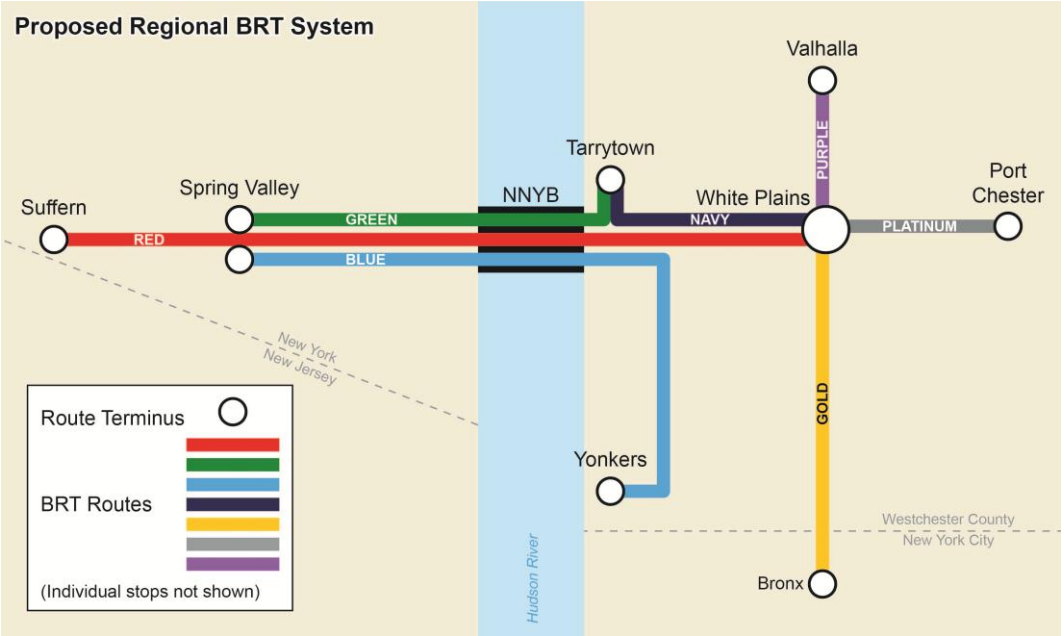

Figure 30: Recommended regional BRT system to begin operation when the NNYB opens in 2018. Local Bee-Line routes in Westchester and TOR routes in Rockland will continue to operate.

Individual Routes

The three proposed inter-county routes – **Red, Blue, and Green** – are designed as a hybrid service in that they serve both a limited local and express function. This service design leverages the strengths of both the local TOR 59 and the TZx to better serve travel needs in the corridor. The TOR 59 will continue to operate along its same route, potentially with increased headways. This will maintain access to important destinations such as Rockland Community College. However the inter-county routes that operate along Route 59 for longer stretches – namely, the Red and Blue routes – will eliminate the existing route deviations on the TOR 59, minimizing both travel time and operating hours.

The four East-of-Hudson lines – **Navy, Gold, Platinum, and Purple** – operate along north-south and east-west routes and are focused around the White Plains TransCenter. The TransCenter will serve as a convenient transfer point for the proposed BRT lines, local bus services, and MNR. The East-of-Hudson lines will operate mostly as limited stop "overlay" services, complementing local bus routes such as the Bee-Line 13 and 20. Headways on the local routes may have to be increased to accommodate the new BRT service frequencies.

(See Figure 31 for a geographic routing map of the full BRT system with proposed stops and interconnections between routes.)

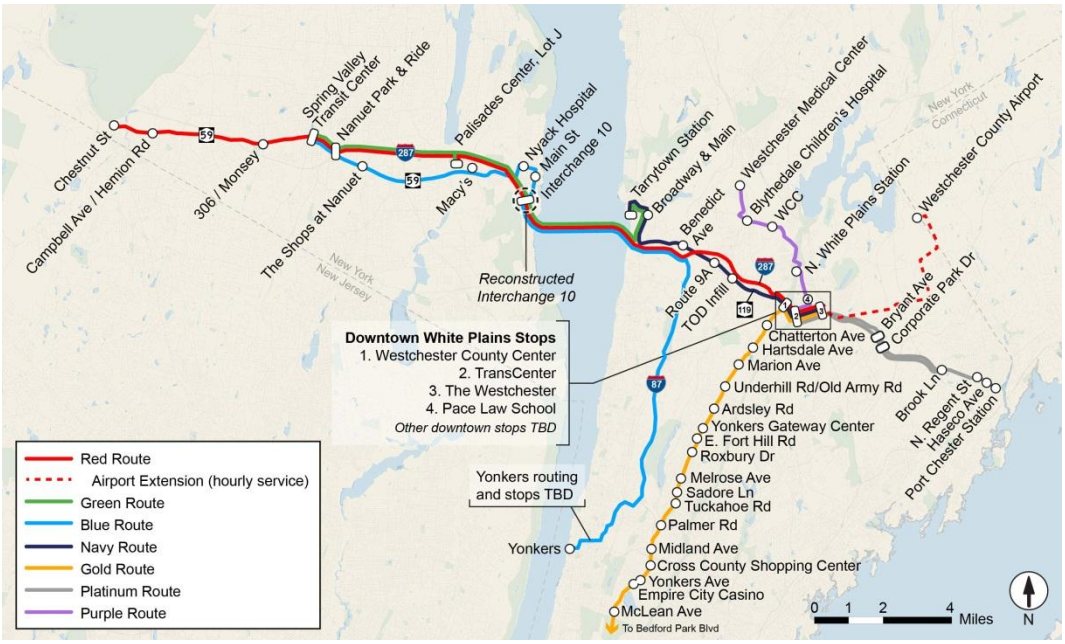

Figure 31: Recommended regional BRT system with proposed stops and transfer points between routes.

The cycle times shown for each route on the following pages represent the round trip running time, plus a 15 percent recovery time to account for buses running behind schedule. The running times for the proposed routes take into account existing bus schedules and traffic conditions while incorporating the travel time savings associated with limited stop service and the package of short-term infrastructure improvements (as detailed in Section 7.1.5). A detailed analysis of travel times along individual segments, along with estimates of how each project improves travel time performance, are presented in Appendix D.

7.1.4.1 Red Route

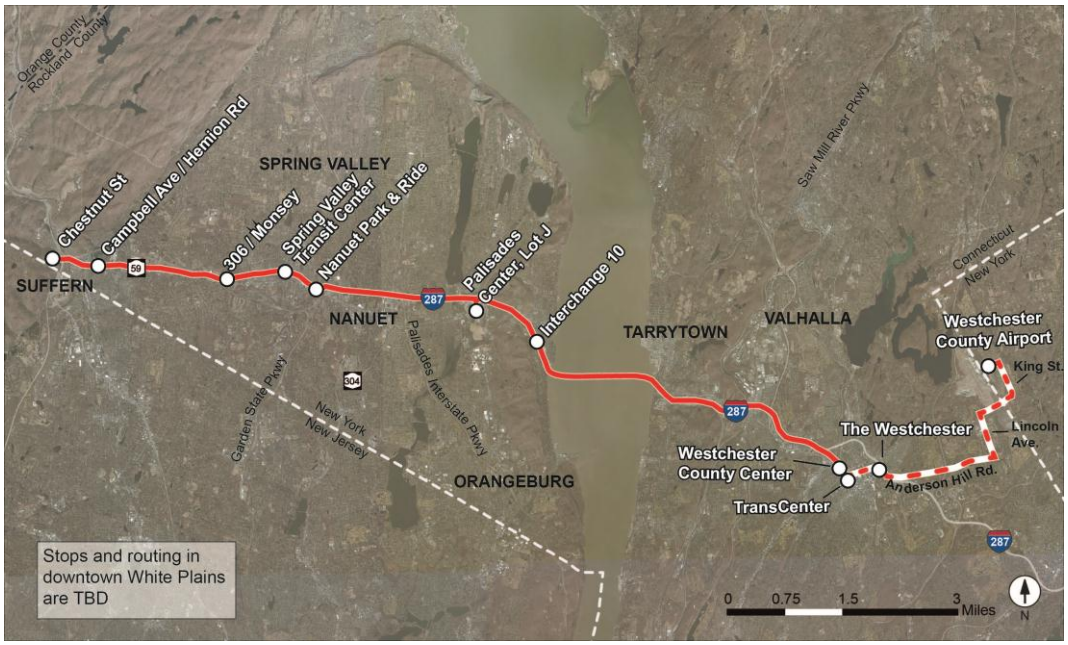

Figure 32: Proposed route connecting Suffern to White Plains, with an extension to Westchester County Airport that will be served once an hour.

The Red Route will serve a local function along Route 59 between Suffern and Nanuet and then operate as an express service on I-287/87 between Nanuet and White Plains with stops at Palisades Center Lot J and Interchange 10 (once reconstructed). (See Figure 32.)

Item	Info
Frequencies (min)	Peak: 15; Off-peak: 30
Termini	Downtown Suffern – The Westchester (with hourly service to Westchester County Airport)
Municipalities Served	West to east: Suffern, Airmont, Monsey, Spring Valley, Nanuet, West Nyack, South Nyack, White Plains
Short-term Stops (#)*	10 (+1 for airport)
Primary Streets Used	West to east: Route 59, I-287/87, Route 119
Interchanges Used	Rockland: Interchanges 14, 12, 10 (once reconstructed) Westchester: Interchange 5
Cycle Time (min)	140
Equipment (# of buses)	8

* Does not include other stops TBD in White Plains

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Red Route	Municipality
Chestnut Street (Downtown Suffern)	Suffern
Campbell Avenue / Hemion Road	Airmont
Route 306 / Monsey	Monsey
Spring Valley Transit Center	Spring Valley
Nanuet Park and Ride	Nanuet
Palisades Center, Lot J Park and Ride	West Nyack
Interchange 10 (once reconstructed)	South Nyack
Westchester County Center	White Plains
White Plains TransCenter	White Plains
The Westchester	White Plains
[Other Downtown White Plains stops TBD]	White Plains
Westchester County Airport (hourly)	White Plains

The Red Route offers the following benefits:

- service and infrastructure enhancements along Route 59, a key commercial corridor and the most heavily traveled bus corridor in Rockland County
- enhanced transit access for residents living in western Rockland County and traveling east for work, shopping, or other needs
- service to park and ride facilities in Monsey, Nanuet, and at Lot J
- hybrid service that serves both local and express markets
    - “local” operations on Route 59 between Suffern and Nanuet
    - “express” operations on I-287/87 between Nanuet and White Plains
- MNR connections at Suffern, Spring Valley, and White Plains
- service to/through downtown White Plains

7.1.4.2 Blue Route

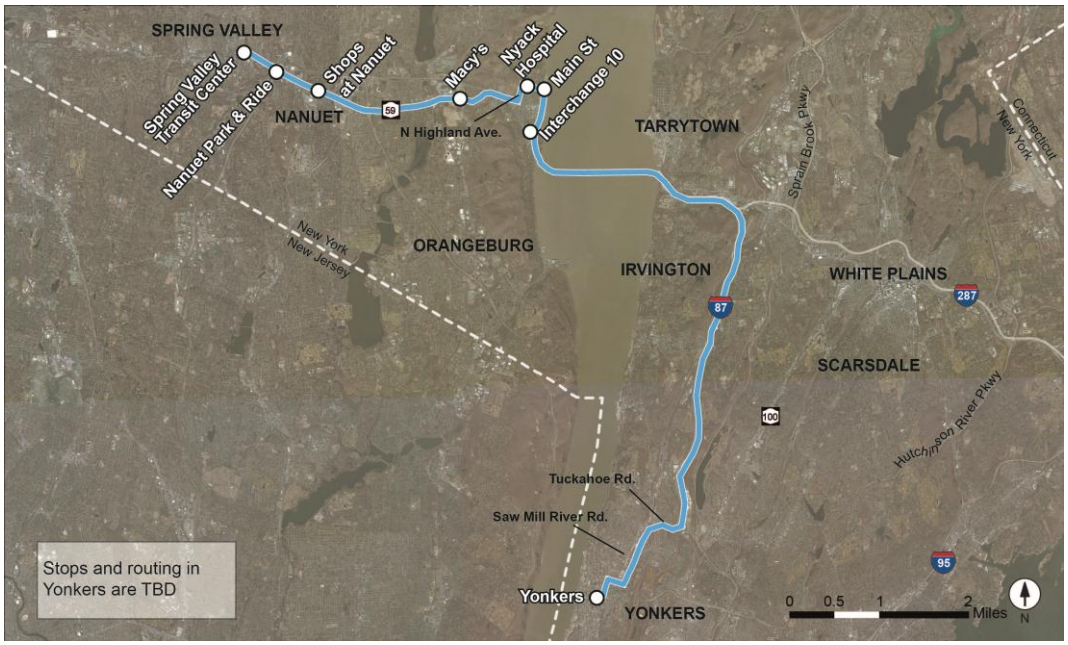

Figure 33: Proposed route connecting Spring Valley to Yonkers. Specific routing and stops in Yonkers are TBD based on future consultation with local stakeholders.

The Blue Route will serve a local function along Route 59 between Spring Valley and Nyack and then operate as an express service on I-287 and I-87 between Interchange 10 in South Nyack (once reconstructed) and Yonkers. (See Figure 33.)

Item	Info
Frequencies (min)	Peak: 15; Off-peak: 30
Termini	Spring Valley MNR – Yonkers
Municipalities Served	West to east: Spring Valley, Nanuet, West Nyack, Nyack, South Nyack, Yonkers
Short-term Stops (#)*	8
Primary Streets Used	West to east: Route 59, local streets in Nyack, I-287, I-87, local streets in Yonkers
Interchanges Used	Rockland: Interchange 10 (once reconstructed) Westchester: Interchanges 8, 6 (I-87/Thruway)
Cycle Time (min)	160
Equipment (# of buses)	9

* Does not include other stops TBD in Yonkers

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Blue Route	Municipality
Spring Valley Transit Center	Spring Valley
Nanuet Park and Ride	Nanuet
The Shops at Nanuet	Nanuet
Macy's (Palisades Center)	West Nyack
Nyack Hospital	Nyack
Main Street (Downtown Nyack)	Nyack
Interchange 10 (once reconstructed)	South Nyack
Yonkers Station (Downtown Yonkers)	Yonkers
[Other Downtown Yonkers stops TBD]	Yonkers

The Blue Route offers the following benefits:

- service and infrastructure enhancements along Route 59, a key commercial corridor and the most heavily traveled bus corridor in Rockland County
- service for Rockland County's largest local travel market (trips between Spring Valley and Nyack)
- new one-seat transit service between Rockland County and Yonkers, the second largest Westchester County work destination for Rockland residents
- service to the park and ride facility in Nanuet
- MNR connection at Spring Valley
- hybrid service that serves both local and express markets
    - "local" operations on Route 59 between Spring Valley and Nyack
    - "express" operations on I-287 and I-87 between Nyack and Yonkers

7.1.4.3 Green Route

Figure 34: Proposed route connecting Spring Valley to Tarrytown

The Green Route would provide peak period service between Spring Valley and the Tarrytown MNR station. It will operate mainly on I-287/87. (See Figure 34.)

Item	Info
Frequencies (min)	Peak: 15; Off-peak: N/A
Termini	Spring Valley MNR – Tarrytown MNR
Municipalities Served	West to east: Spring Valley, Nanuet, West Nyack, South Nyack, Tarrytown
Short-term Stops (#)	5
Primary Streets Used	West to east: I-287/87, local streets in Tarrytown
Interchanges Used	Rockland: Interchanges 14, 12, 10 (once reconstructed) Westchester: Interchange 9
Cycle Time (min)	90
Equipment (# of buses)	4

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Green Route	Municipality
Spring Valley Transit Center	Spring Valley
Nanuet Park and Ride	Nanuet
Palisades Center, Lot J Park and Ride	West Nyack
Interchange 10 (once reconstructed)	South Nyack
Tarrytown Station	Tarrytown

The Green Route offers the following benefits:

- MNR connection at Tarrytown during peak periods. Midday service is eliminated because there is little demand between Rockland County and Tarrytown during this time.
- Faster access to MNR in Tarrytown than White Plains between approximately 8 and 9 AM once I-287 between Interchanges 9 and 5 in Westchester becomes congested.

7.1.4.4 Navy Route

Figure 35: Proposed route connecting Tarrytown to White Plains. Specific routing and stops in White Plains are TBD based on future consultation with local stakeholders.

The Navy Route will operate mainly on Route 119 between the Tarrytown MNR station and downtown White Plains. (See Figure 35.)

Item	Info
Frequencies (min)	Peak: 15; Off-peak: 20
Termini	Tarrytown MNR – The Westchester
Municipalities Served	West to east: Tarrytown, Elmsford, White Plains
Short-term Stops (#)*	8
Primary Streets Used	West to east: Central Avenue, Broadway Route 119
Interchanges Used	None
Cycle Time (min)	80
Equipment (# of buses)	6

* Does not include other stops TBD in White Plains

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Navy Route	Municipality
Tarrytown Station	Tarrytown
Broadway & Main (Downtown Tarrytown)	Tarrytown
Benedict Avenue	Tarrytown
Route 9A (Downtown Elmsford)	Elmsford
TOD Infill (Rt 119, Elmsford)	Elmsford
Westchester County Center	White Plains
White Plains TransCenter	White Plains
The Westchester	White Plains
[Other Downtown White Plains stops TBD]	White Plains

The Navy Route offers the following benefits:

- service to retail and employment destinations along Route 119
- MNR connections at Tarrytown and White Plains
- service to/through downtown White Plains

7.1.4.5 Gold Route

Figure 36: Proposed route connecting White Plains to the Bronx. Specific routing and stops in White Plains are TBD based on future consultation with local stakeholders.

The Gold Route will operate mainly along Central Avenue between downtown White Plains and Bedford Park Boulevard in the Bronx. (See Figure 36.) The alignment, stops, and features of this route were adopted from the recommendations of the *Central Avenue Bus Rapid Transit Assessment Study*, commissioned by Westchester County in 2008/2009. The Gold Route would replace the existing Route 21 Limited.

Item	Info
Frequencies (min)	Peak: 10; Off-peak: 20
Termini	The Westchester – Bedford Park Blvd, Bronx
Municipalities Served	North to south: White Plains, Hartsdale, Scarsdale, Greenville, Yonkers, Bronx
Short-term Stops (#)*	24
Primary Streets Used	North to south: Route 119, Central Avenue, Jerome Avenue
Interchanges Used	None
Cycle Time (min)	130
Equipment (# of buses)	14

* Does not include other stops TBD in White Plains

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Gold Route	Municipality
The Westchester	White Plains
White Plains TransCenter	White Plains
Westchester County Center	White Plains
[Other Downtown White Plains stops TBD]	White Plains
Chatterton Avenue	White Plains
Hartsdale Avenue	Hartsdale
Marion Avenue	Hartsdale
Underhill Road / Old Army Road	Scarsdale
Ardsley Road	Greenville
Yonkers Gateway Center	Yonkers
E. Fort Hill Road	Yonkers
Roxbury Drive	Yonkers
Melrose Avenue	Yonkers
Sadore Lane	Yonkers
Tuckahoe Road	Yonkers
Palmer Road	Yonkers
Midland Avenue	Yonkers
Cross County Shopping Center	Yonkers
Yonkers Avenue	Yonkers
Empire City Casino	Yonkers
McLean Avenue	Yonkers
Woodlawn subway station (Bronx)	Bronx
Gun Hill Road (Bronx)	Bronx
Mosholu Parkway (Bronx)	Bronx
Bedford Park Boulevard subway station (Bronx)	Bronx

The Gold Route offers the following benefits:

- service and infrastructure enhancements along Central Avenue, the most heavily traveled bus corridor in Westchester County
- service for one of Westchester County's largest local travel markets (trips between White Plains and Yonkers)
- MNR connection at White Plains
- service to/through downtown White Plains
- MTA subway connections in the Bronx

7.1.4.6 Platinum Route

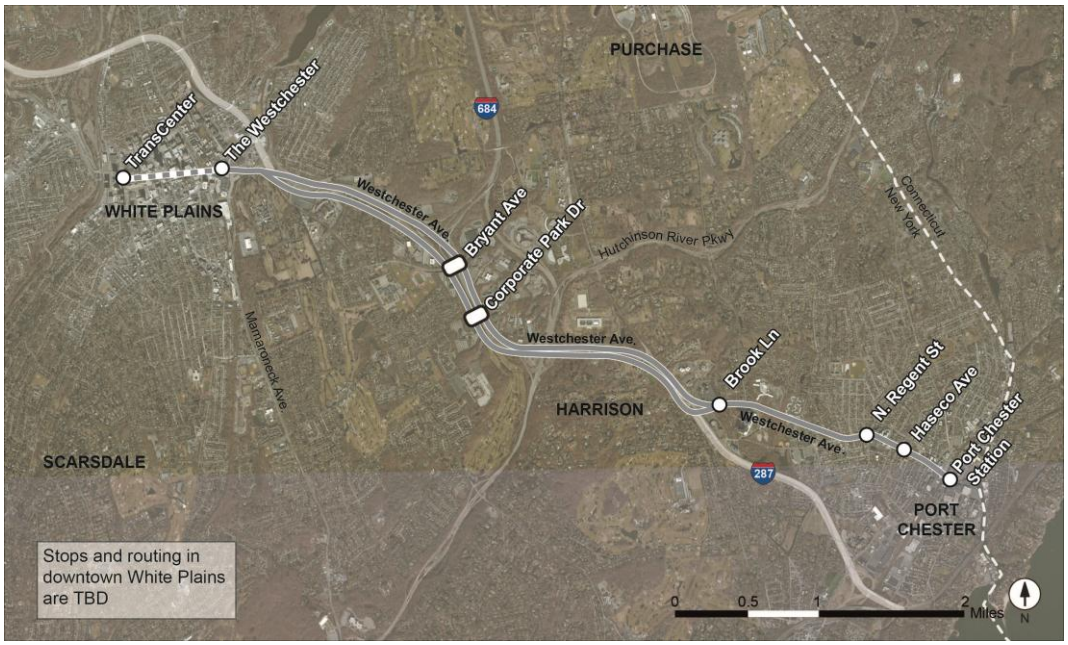

Figure 37: Proposed route connecting Port Chester to White Plains. Specific routing and stops in White Plains are TBD based on future consultation with local stakeholders.

The Platinum Route will operate mainly on Westchester Avenue between the White Plains TransCenter and the Port Chester MNR station. (See Figure 37.)

Item	Info
Frequencies (min)	Peak: 15; Off-peak: 20
Termini	White Plains TransCenter – Port Chester MNR
Municipalities Served	West to east: White Plains, Harrison, Rye Brook, Port Chester
Short-term Stops (#)*	8
Primary Streets Used	West to east: Local streets in White Plains, Westchester Ave
Interchanges Used	None
Cycle Time (min)	60
Equipment (# of buses)	5

* Does not include other stops TBD in White Plains

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Platinum Route	Municipality
White Plains TransCenter	White Plains
The Westchester	White Plains
[Other Downtown White Plains stops TBD]	White Plains
Bryant Avenue (Platinum Mile)	Harrison
Corporate Park Drive (Platinum Mile)	Harrison
Brook Lane (Platinum Mile)	Rye Brook
N. Regent Street	Port Chester
Haseco Avenue	Port Chester
Port Chester Station (Downtown Port Chester)	Port Chester

The Platinum Route offers the following benefits:

- service to large employment destinations along Westchester Avenue (the Platinum Mile)
- MNR connections at White Plains and Port Chester
- service to/through downtown White Plains

7.1.4.7 Purple Route

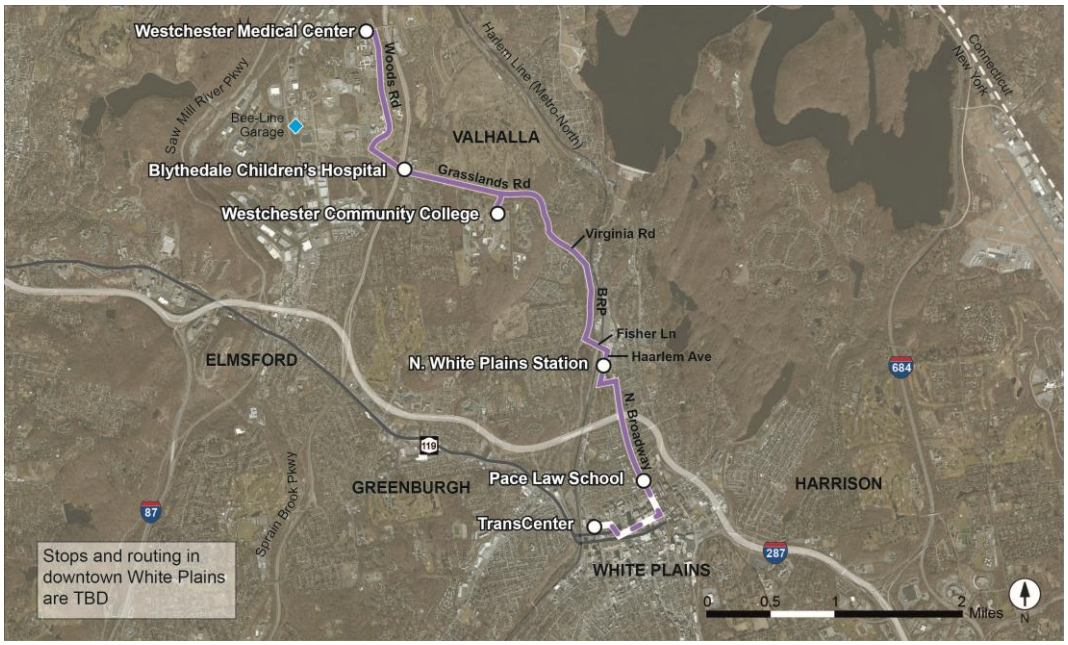

Figure 38: Proposed route connecting Valhalla to White Plains. Specific routing and stops in White Plains are TBD based on future consultation with local stakeholders.

The Purple Route will operate between the White Plains TransCenter and Westchester Medical Center in Valhalla. (See Figure 38.)

Item	Info
Frequencies (min)	Peak: 15; Off-peak: 20
Termini	White Plains TransCenter – Westchester Medical Center
Municipalities Served	North to south: Valhalla, White Plains
Short-term Stops (#)*	6
Primary Streets Used	North to south: Woods Road, Grasslands Road, Virginia Road, Bronx River Pkwy, N. Broadway
Interchanges Used	None
Cycle Time (min)	50
Equipment (# of buses)	4

* Does not include other stops TBD in White Plains

Proposed Stops

All stops are preliminary based upon studies undertaken. The MTTF recommends that final stop determinations be made in conjunction with/and based upon input from local municipalities.

Purple Route	Municipality
White Plains TransCenter	White Plains
[Other Downtown White Plains stops TBD]	White Plains
Pace Law School	White Plains
N. White Plains Station	White Plains
Westchester Community College	Valhalla
Blythedale Children's Hospital	Valhalla
Westchester Medical Center	Valhalla

The Purple Route offers the following benefits:

- service to major medical and education centers located just north of the I-287 corridor
- service to large employment destinations in Westchester County
- MNR connection at North White Plains
- service to/through downtown White Plains

7.1.5 Physical System Components

7.1.5.1 Dedicated Transit Lanes

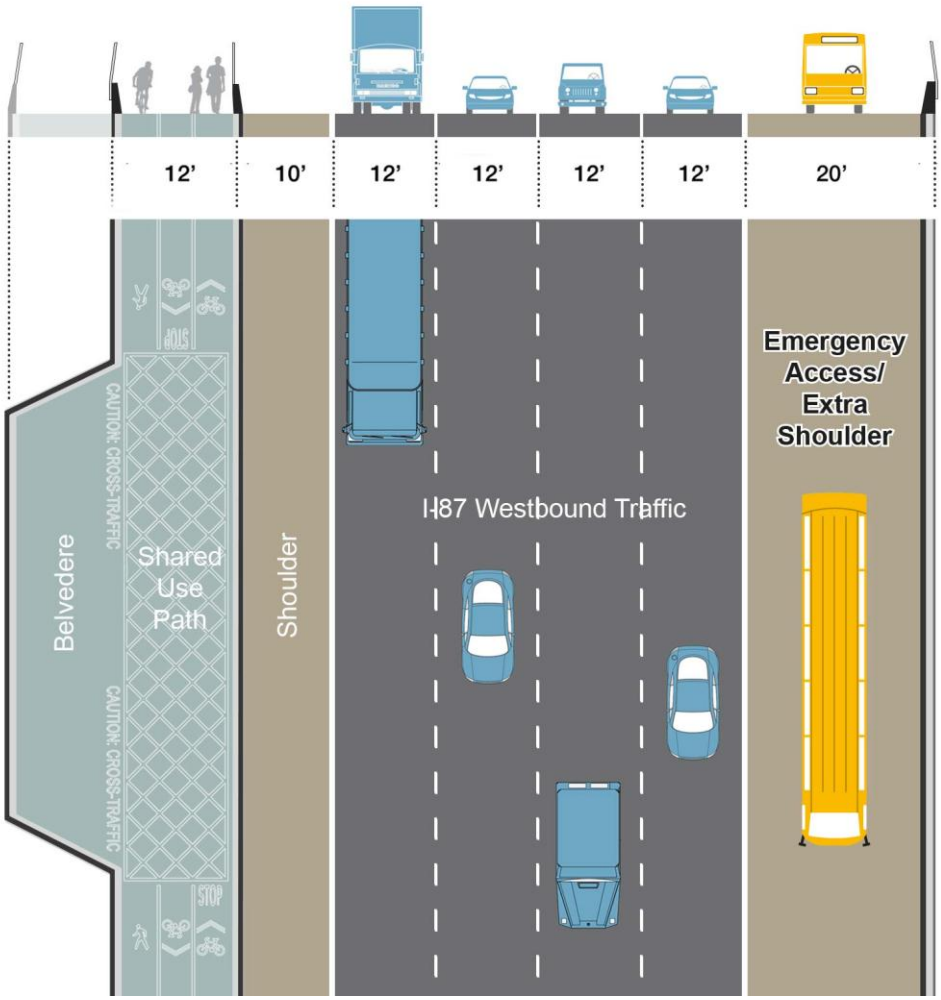

Figure 39: The NNYB will have extra wide shoulders with additional lane capacity for the new BRT system which will allow buses to move across the bridge faster. (Source: TZC/HDR)

What is it?

In some locations, the BRT buses would run in dedicated lanes to improve travel times. By moving buses into their own space, regular traffic can move faster as well. The dedicated lanes assume three recommended configurations: painted lanes, dedicated bus lanes that are physically separated from other traffic, and "queue jump" lanes at major intersections. Queue jump lanes, which appear only at intersections adjacent to general traffic lanes, are used only by buses to bypass lines of cars waiting at traffic signals. From these lanes buses get an advanced green signal which allows them to "jump" ahead of traffic for a travel time advantage. Generally, queue jump lanes are only recommended at

intersections where the existing layout can accommodate them without major construction or road widening.

Where will it go?

The longest section of transit lanes available to the new BRT vehicles will be three-miles of extra wide shoulder space on the NNYB in both directions. (See Figure 39.) Painted bus lanes are recommended for specific route segments in downtown White Plains and along Central Avenue. Queue jump lanes are recommended for select intersections on Route 59 and Central Avenue as well as at the Interchange 5 eastbound off-ramp in White Plains.

Why is this important?

To improve bus travel times and enhance system reliability.

7.1.5.2 I-287 Congestion Control: Ramp Metering

What is it?

A typical highway on-ramp allows vehicles to merge into traffic whenever gaps are available. However, too many vehicles can merge onto highways at once, which can slow traffic. Ramp metering uses traffic signals placed at the end of highway on-ramps to regulate or “meter” the flow of vehicles onto the highway. (See Figure 40.) Ramp metering therefore increases highway vehicle speeds and decreases travel time for all traffic by restricting the flow of vehicles onto the highway. On-ramps can also have bus bypass lanes which allow buses to move past vehicle queues at meters to provide an even greater time benefit for transit vehicles.

Figure 40: Ramp Meter. (Source: Michael Hicks, Creative Commons)

Where will it go?

Interchange 14A eastbound; Interchange 14 (both on-ramps); Interchange 13 (all four on-ramps); Interchange 12 (both on-ramps); Interchange 11 westbound; Interchange 10 (both on-ramps); Interchange 9 (both on-ramps); Interchange 1 (both on-ramps); Interchange 4 (both on-ramps); and Interchange 5 westbound.

Bus bypass lanes are recommended for the following on-ramps: Interchange 14 eastbound; Interchange 12 (both on-ramps); Interchange 10 eastbound; and Interchange 5 westbound.

Aerial images of each ramp showing their length can be found in Appendix D.

Why is this important?

To improve the flow of vehicles and buses on I-287, particularly during the AM and PM rush.

7.1.5.3 Traffic Signal Improvements

What is it?

Traffic signal improvements include the installation of new, technology-enabled, energy-efficient traffic signals. These signals will allow for the use of adaptive signal control technology and Transit Signal Priority (TSP). Adaptive signals are integrated with a regional transportation management center and can change throughout the day in response to demand or traffic conditions. The signals work in concert with each other to coordinate green lights and speed travel times. TSP allows buses to communicate with traffic signals to prolong green lights as the buses approach intersections, allowing them to get through the signal before it turns red. (See Figure 41.) Improvements to traffic signals throughout the system will provide benefits to all users: BRT passengers, automobile drivers, and pedestrians.

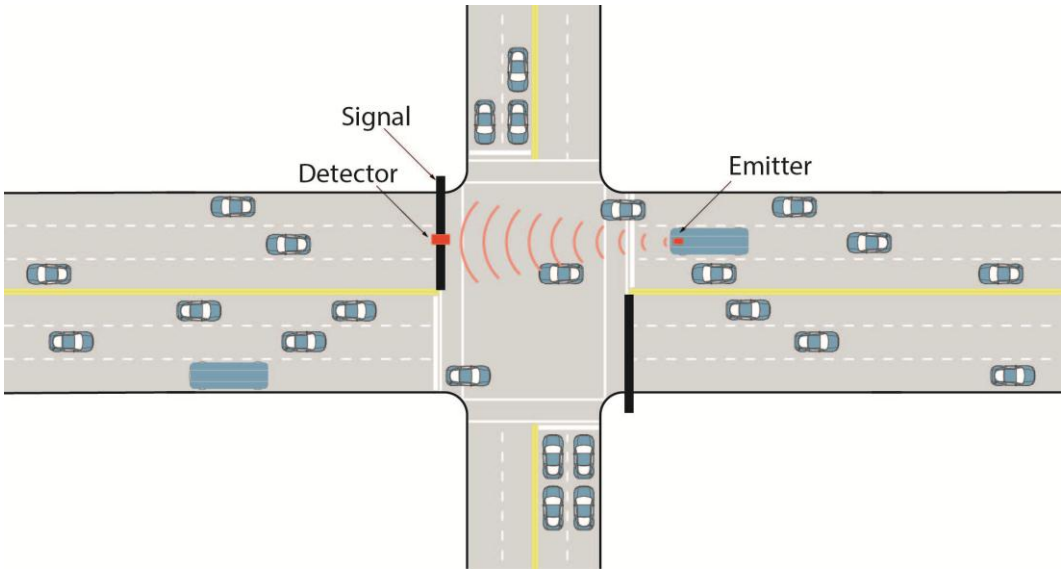

Figure 41: TSP allows buses to prolong green lights to prevent additional stops at intersections (Source: Arup)

Where will it go?

At select intersections along Route 59, Route 119 and Central Avenue.

Why is this important?

To create smoother travel flows and improve travel conditions for all users along major roadways. TSP will also allow buses to move from station to station faster and more efficiently, limiting the number of stops at red lights.

7.1.5.4 Route 59 "Smart Corridor"

What is it?

A "Smart Corridor" along Route 59 in Rockland County would incorporate a package of "intelligent" traffic and signal improvements that will improve traffic and decrease transit travel times without widening the road. This package includes:

- new traffic signals
- updated signal timings to improve traffic along Route 59
- adaptive signal control technology between Route 306 in Monsey and Smith Street in Nanuet which will allow for an advanced traffic control system that can respond to changing travel conditions
- pedestrian improvements, including new countdown crossing signals at intersections

Where will it go?

Route 59 between Suffern and Nyack. (See Figure 42.)

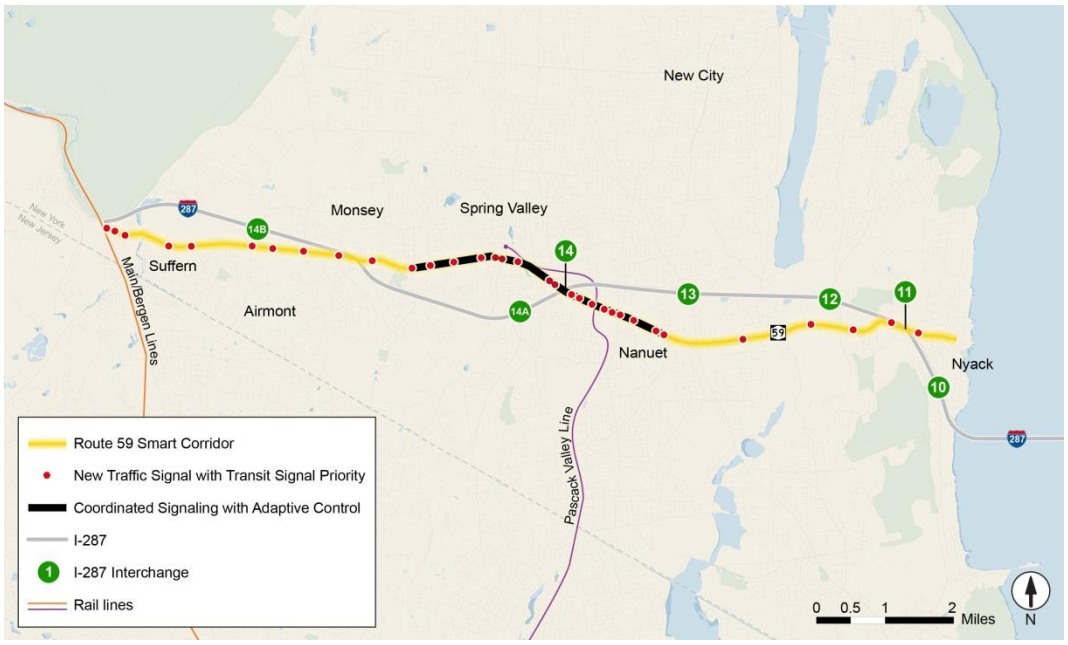

Figure 42: Route 59 "Smart Corridor" showing proposed improvements

Why is this important?

To reduce travel times along a highly-traveled corridor. Travel times can be reduced in a variety of ways. For transit, the proposed BRT routes will eliminate the route diversions that existing buses follow. Simpler and more direct routing would keep buses on Route 59 for its entire length between Suffern and Nyack. By remaining on Route 59, the system will maximize use of the Smart Corridor enhancements. It is also recommended that buses make fewer stops than existing local buses. Fewer stops mean more time moving. For all traffic – cars and buses – the new traffic signals along Route 59 will be timed to allow for smoother traffic flows so that vehicles can move more efficiently from green light to green light.

7.1.6 Areas for Further Evaluation in the Short-Term

7.1.6.1 White Plains Access and Station Area Study

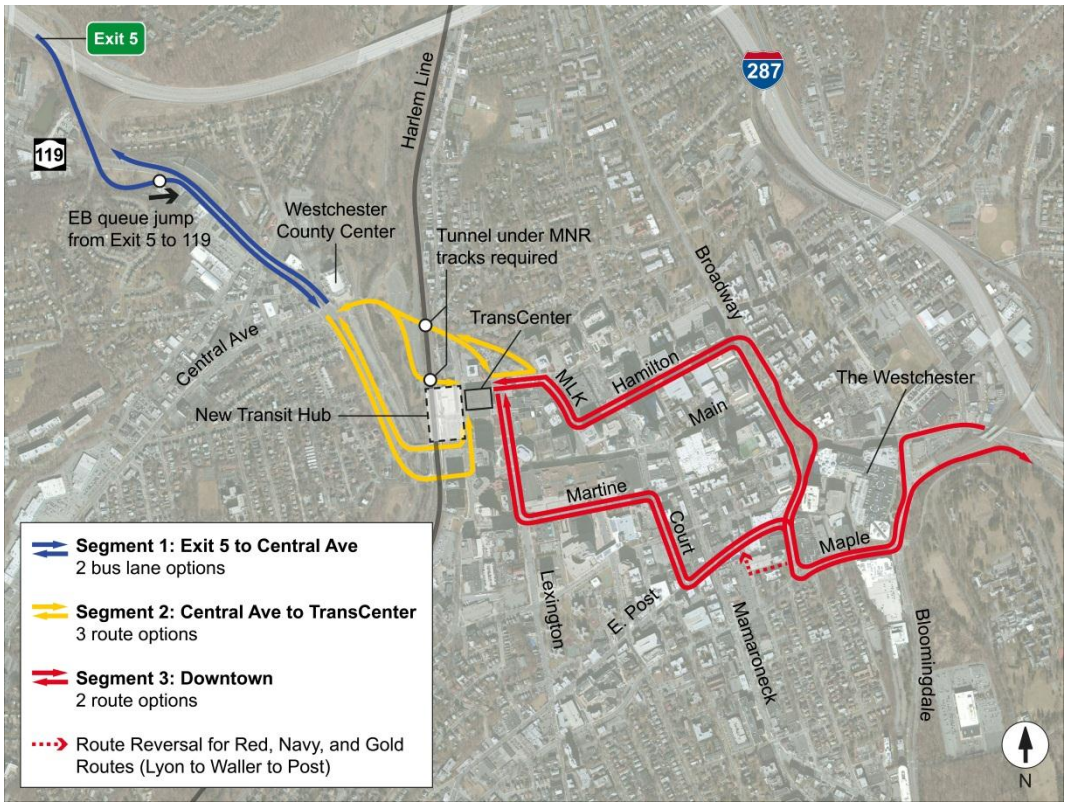

Figure 43: Proposed transit infrastructure and routing options for downtown White Plains

What is it?

The City of White Plains has been awarded a $1 million grant by Mid-Hudson Regional Economic Development Council (MHREDC) to study station and access improvements and potential development around the Metro-North train station. The goal is to develop a plan for a new, regional, multimodal transportation center and maximize the economic development potential of the surrounding area while also improving access to the station itself. (See Figure 43 for potential access alternatives to/from White Plains Station. For Segment 1, in blue, two options for dedicated bus lanes were considered; for Segment 2, in yellow, three route options to the station area were considered; and for Segment 3, in red, two route options through downtown White Plains were considered. See Figure 44 for an example of mixed-use, transit-oriented development.)

Where will it go?

White Plains Station Area

Why is this important?

To create a greatly enhanced regional hub for the transit system. This plan will set the stage for an improved gateway to the City, better intermodal transit connections, new economic opportunities for the City, and a more pedestrian-friendly and sustainable environment.

Figure 44: Example of transit-oriented development (Source: Arup)

7.1.6.2 Corridor Preservation Study

What is it?

Members of the MTTF believe there is a need to reserve space within the I-287 corridor for future transit and transportation needs. Today there is insufficient room to allow for the introduction of new measures to improve transit or transportation performance. Further study of this idea was called for, and a Corridor Preservation Study is recommended to look at future needs and ensure corridor space is reserved in the event new facilities are desired. The study would be undertaken in partnership with local, regional, and state leadership.

Where will it go?

I-287 corridor in Rockland County and Westchester Counties

Why is this important?

This evaluation would help to define and preserve the area along I-287 needed to accommodate future interchange improvements and transit infrastructure investments.

7.1.6.3 Interchange 10 Reconstruction / South Nyack Study

What is it?

The Village of South Nyack has applied for a $250,000 grant through the NNYB Community Benefit Program to study Interchange 10 and potential development opportunities surrounding it. This interchange in South Nyack is confusing and occupies a large 25-acre footprint. The study could investigate possible reconfigurations that would ideally include an in-line BRT station on a smaller footprint which could free up valuable land for development or local use.

Where will it go?

Interchange 10 in South Nyack

Why is this important?

To improve a confusing and inefficient highway interchange, provide a future multimodal transit station, and create new economic development opportunities for the Village of South Nyack.

7.1.6.4 Interchange 14X Study

What is it?

A new interchange at the intersection of I-287/87 and Route 59 could provide new Thruway access to the growing communities in the Monsey area of Rockland County. A study would evaluate the impacts of the new interchange on I-287/87, Route 59, and local roads. This study effort could set up or serve as the foundation for an Environmental Impact Study (EIS) and/or Access Justification Report (AJR), required by the Federal Highway Administration (FHWA) for new Interstate access.

Where will it go?

Where Route 59 crosses I-287/87 near Airmont/Viola/Monsey (See Figure 45)

Why is this important?

To study a new access point to/from I-287/87 and its potential for relieving traffic along Route 59.

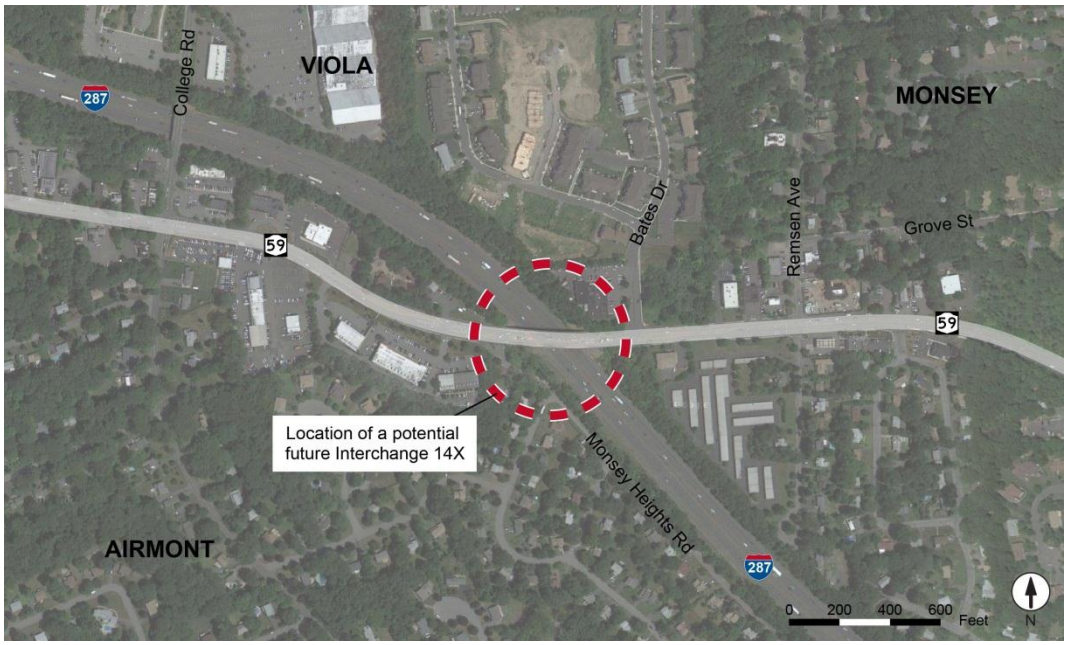

Figure 45: The location of a potential future Interchange 14X

7.1.7 Other Short-Term Improvement Strategies

7.1.7.1 Transportation Demand Management Programs

What is it?

Transportation demand management (TDM) is the term used for policies or programs aimed at reducing congestion by encouraging public transit use or carpooling, especially during the most congested times of day. Other strategies encourage travelers to alter their work hours so that traffic volumes shift from peak periods to less congested times of the day. TDM actions require no capital investment and are almost always voluntarily led by the private sector with encouragement or guidance from the public sector. The MTTF recommends studying the value and application of TDM programs in the region.

Where will it go?

At the local and regional level throughout the region, but especially in the I-287 corridor.

Why is this important?

To study alternative means of relieving congestion throughout the I-287 corridor through sets of voluntary policies and programs that incentivize transit use and de-incentivize single-occupancy car travel during peak periods.

7.1.7.2 Transit-Oriented Development

What is it?

Transit works best when key centers of activity are concentrated at either or both ends of a trip. These centers are typically comprised of compact, mixed-use land use developments. Their proximity to transit makes using transit for daily trips more attractive. If these developments are designed to be conducive to transit, i.e., walkable and less auto-oriented, then “transit-oriented development” or TOD is created. In the I-287 corridor, the potential to establish these types of conditions already exist in a number of locations.

Where will it go?

The MTTF recommends evaluating numerous locations for potential TOD in both Rockland and Westchester Counties. The MTTF has looked at the land uses and the densities needed to support transit as part of their purview. Part of New York State’s home rule provision places jurisdiction for land use at the local level. The MTTF recognizes this and encourages local municipal government to work with county and state governments to help create transit villages along these corridors and around the stations.

In support of that larger policy recommendation, the MTTF identified steps that can be taken to support transit.

Possible locations for TOD, based on further analysis and input from local municipalities could include:

Rockland County

- Downtown Suffern
- Spring Valley, particularly at/near the MNR station
- Nanuet, at/near the park and ride
- Nanuet, along Route 59
- Palisades Center, Lot J
- Interchange 10 (if reconstructed to free up land for development)
- Downtown Nyack

Westchester County

- Downtown Tarrytown
- Tarrytown Station
- Elmsford
- White Plains
- Platinum Mile
- Downtown Port Chester
- Downtown Yonkers

Why is it important?

Transit and TOD are important to attract new businesses and residents to the region. In addition, the recommended BRT system will be more successful when it is supported by concentrations of people and jobs.

7.1.7.3 West-of-Hudson Rail Improvements

What is it?

The MTTF recognized that West-of-Hudson residents and local economies are disadvantaged by the lack of a one-seat ride to New York City. Much effort was directed at identifying transit improvements there that would increase service, make trains faster, and provide better connections to New York City. To achieve the longer-term service and infrastructure improvements along West-of-Hudson rail lines, the MTTF recommends reconvening key agencies in the short-term to discuss paths forward on improvements that may include:

- Increasing PM express service on the Main/Bergen Lines to the Ramsey/Route 17 Station. While located in Bergen County, New Jersey, the station is used by residents from both New York and New Jersey. Currently there are six weekday morning express trains but only two express return trips in the evening.
- Infrastructure improvements along the Pascack Valley Line. These improvements may include: augmented storage space for trains in Rockland County, passing sidings, full double-tracking, and the elimination of some or all at-grade crossings along the line. In 2007, Harriet Cornell, then Chairwoman of the Rockland County Legislature and current MTTF member, brought together staff from MNR and NJT to tour the line and develop a scope of improvements to study.
- Introduction of a passenger service to the West Shore Line, a 31-mile freight rail line running between Hoboken in the south and West Nyack in the north. This was studied in 1999, and despite interest at that time and growing demand for transit in the region, the project has not progressed because of increased freight rail traffic along the line. Convincing CSX (owner/operator of the West-Shore Line) to share the right-of-way continues to be an obstacle to developing this further.
- Construction of Amtrak's Gateway Tunnel project including the "Bergen Loop" which will allow one-seat rides into Manhattan for Pascack Valley, Main/Bergen, and Port Jervis Line riders.

These improvements and initiatives can only be achieved through the coordinated efforts of a number of agencies and private companies. The parties needed to advance these improvements include: MNR, NJT, Amtrak, NYSDOT, and CSX. The MTTF recommends in the short-term that all of these entities begin to meet and discuss next steps on realizing these improvements.

Where will it go?

Rockland County, Orange County, New York City, and the State of New Jersey

Why is it important?

West-of-Hudson rail improvements would result in a much better ride experience for Manhattan-bound commuters. They would also open up Rockland County and Orange County residents to new jobs and economic activity. Starting the conversation among key agencies with controlling interests in West-of-Hudson rail operations is the first step in realizing operational and physical improvements. These improvements are necessary to create faster trips at more convenient times and better overall access to and from New York City.

7.1.8 Transit Performance Evaluation

7.1.8.1 Ridership

Ridership estimates for the proposed system were developed by projecting the change in number of riders due to the service features of the short-term transit package, including travel time, service frequency, and service expansion as well as the quality of the passenger experience. Ridership in the corridor is estimated to increase by 10,150 daily trips between 2012 and 2018 with full implementation of the proposed BRT system. (See Table 7 for a comparison between existing and estimated future ridership.)

Table 7: Existing and estimated future ridership

Service Area	Existing Service (in corridor)	Existing Daily Ridership (2012)	Proposed Service (New BRT services in bold)	Projected Daily Ridership (2018)	New Riders
ROCKLAND COUNTY	Local Route Service*	3,880	Local Route Service*	2,100	
	TZx	1,820	**Red Route**	**2,900**	
			Blue Route	**2,500**	
			Green Route	**800**	
	Rockland Sub-Total	*5,700*	*Rockland Sub-Total*	*8,300*	*2,600*
WESTCHESTER COUNTY	Local Route Service*	24,050	Local Route Service*	12,000	
			Navy Route	**2,500**	
			Platinum Route	**2,100**	
			Gold Route	**11,300**	
			Purple Route	**3,700**	
	Westchester Sub-Total	*24,050*	*Westchester Sub-Total*	*31,600*	*7,550*
	GRAND TOTAL	**29,750**	**GRAND TOTAL**	**39,900**	**10,150**

* Route sections operating within corridor only

More detailed information on ridership calculations can be found in Appendix D.

7.1.8.2 Travel Times

The proposed service will be faster than existing services for several reasons. Buses will take advantage of the extra wide shoulders on the NNYB. It is recommended that ramp meters installed at I-287 on-ramps throughout the corridor regulate highway access, thereby smoothing traffic flows for transit and drivers alike. Recommended traffic management systems on Route 59 and Route 119 in White Plains, along with transit-only lanes in White Plains, would allow transit to bypass congestion. Proposed access improvements to White Plains Station – that can be used by both local buses and BRT – would shave time off the total journey. Combined, all interventions will allow transit to move much more quickly, while improving travel times for drivers as well.

Existing and estimated future travel times were evaluated for four trips representing the trans-Hudson market (Nanuet to Tarrytown and White Plains), the intra-Rockland market (Suffern to Nyack), and East-of-Hudson along the heavily traveled White Plains-Bronx route. (See Table 8 for a comparison between the existing and anticipated travel times.)

The times assume full build-out of the transit system and the complete list of short-term capital improvements, including:

- use of the extra wide shoulders on the NNYB
- ramp metering on I-287
- Route 59 “Smart Corridor” upgrades
- other signal improvements and TSP along the BRT routes
- dedicated transit lanes
- station access improvements in White Plains

Table 8: Travel time savings along five representative BRT routes

Origin	Destination	Existing Travel Time (min)	Future Travel Time (min)	Minutes Saved	% Travel Time Improvement
Spring Valley (Transit Center)	Tarrytown MNR	46	42	4	9%
	White Plains TransCenter	55	45	10	18%
Suffern	White Plains	84	64	20	24%
Suffern	Nyack	74	50	24	32%
White Plains	Bronx	75	48	27	36%

Overall, the average travel times of the proposed system will range from 4 minutes to 27 minutes faster than existing scheduled routes. (See Figure 46.) More detailed information on travel time savings associated with particular infrastructure investments can be found in Appendix D.

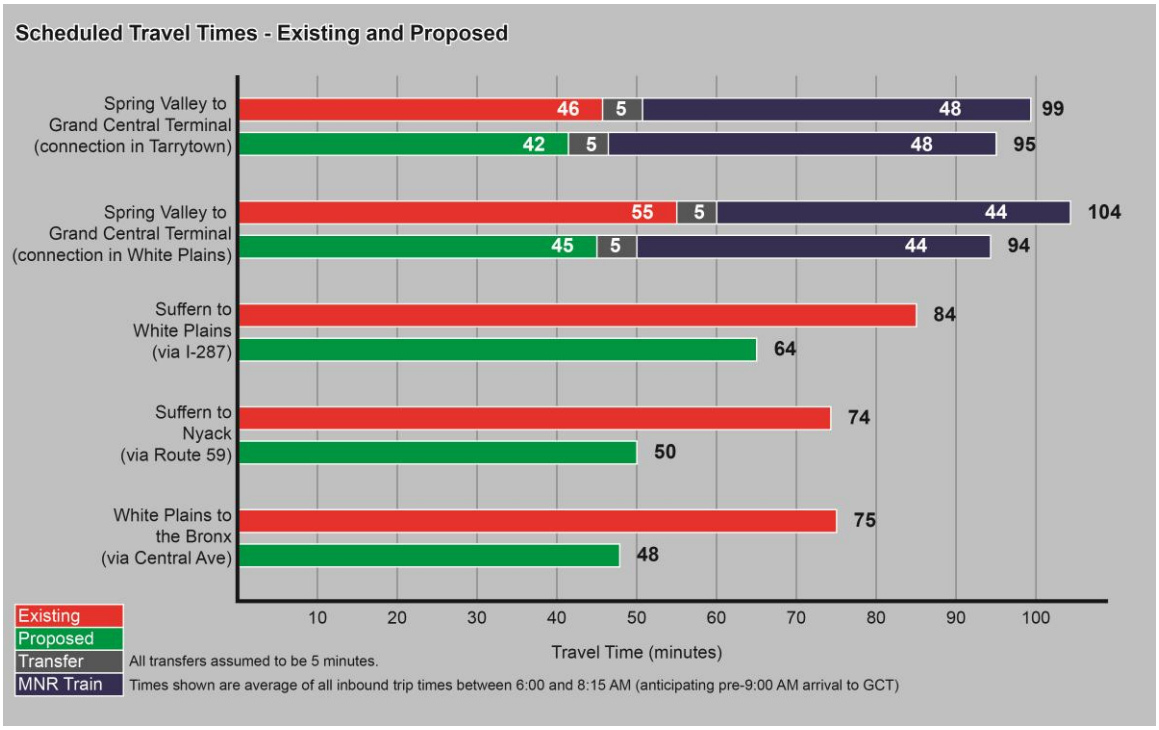

Figure 46: Proposed BRT routes offer time savings compared with existing scheduled service. Shown are representative trips on five proposed BRT routes including two with MNR connections to Grand Central Terminal.

7.1.9 Options for BRT System Operations

The MTTF recognized early on that a BRT system, no matter how well designed and equipped, can only be successful if it is managed and operated properly. Therefore, the MTTF identified five potential management options they concluded would have the ability to properly operate the BRT system. Although all five options would have the ability to successfully implement the system in the short-term and operate it going forward, each would also have challenges that would need to be addressed.

- Rockland County/TOR and Westchester County/Bee-Line (current operations)
- Westchester County/Bee-Line (system wide)
- Metropolitan Transportation Authority (MTA) (system wide)
- New bi-county entity for the BRT system
- Consolidated bi-county transit entity (including the BRT system)

7.1.9.1 Rockland County/TOR and Westchester County/Bee-Line (Status Quo)

Under this option, Rockland County would continue to operate the trans-Hudson bus service. Service would be increased and realigned to conform to the suggested service plan. But Rockland and Westchester operations would be expanded under existing agencies. Bee-Line would operate Westchester services and the two operators would coordinate schedules and fares.

Opportunities

- No change – This is the easiest to implement given agencies and riders are familiar with the system.
- Local knowledge –County staffs know and understand county residents and their needs.
- Consistency with local agencies and plans –County staffs design service and capital improvements in concert with local planning practices and desires.
- Cost – Rockland County has the lowest hourly operating cost among operators in the corridor.

Challenges

- Rider experience – The two systems will continue to be separate and therefore lack ease of use. Integration may be difficult.
- Inter-county coordination – The current challenges will continue to be an issue and will need to be addressed.
- Effectiveness – There are no real economies of scale that bring a tangible benefit to the operators.

7.1.9.2 Westchester County/Bee Line

Under this option, Westchester County would assume trans-Hudson operations and would integrate service delivery with Bee-Line services. Service would be increased and realigned to conform to the suggested service plan.

Opportunities

- Expertise – Bee-Line has a well-defined transit program, with a large and professional staff and an aggressive approach to making transit better in the County. Bee-Line carries about 110,000 passengers daily versus about 11,000 daily for Rockland County services (TOR and TZx) and 400+ buses in the fleet vs. about 60 at TOR/TZx.
- Economies of Scale

Challenges

- Little knowledge of Rockland origins – Bee-Line staff are focused on Westchester County issues but not Rockland and therefore do not have the same level of understanding of the Rockland market as do Rockland County staff.
- Consistency – Substituting Bee-Line for Rockland County would interrupt current and historic institutional relationships and could result in passenger service letdowns during a transition period and perhaps even longer.
- Cost – Bee-Line hourly operating costs are higher than TZx costs (about $160 vs. $130 per hour (CY 2011)).

7.1.9.3 Metropolitan Transportation Authority / Metro-North Railroad

Under this option, Metro-North would manage delivery of the trans-Hudson service in accordance with the suggested service plan. This approach is similar to the Hudson Rail Link, serving Spuyten Duyvil and Riverdale MNR stations or the Newburgh-Beacon ferry services.

Opportunities

- Mission –The new corridor services could be viewed as extensions of Metro-North trains and has precedent within the region.
- Coordination – Operating both trains and connecting bus service can enhance schedule and fare coordination, leading to a seamless passenger experience.

Challenges

- Mission creep – Metro-North and MTA have recently been shedding local, boutique services (e.g., Long Island Bus) and divesting to local agencies to operate the services.
- Little knowledge of county origins/destinations – Metro-North staff are focused on operating trains and understanding markets primarily to and from Manhattan. They do not have the same level of understanding of the Rockland market as Rockland County staff does or the Westchester market as Bee-Line staff does.
- Consistency – Instituting Metro-North as operator would interrupt current and historic institutional relationships and could result in passenger service letdowns during a transition period and perhaps longer.

7.1.9.4 New Bi-County Entity for the BRT System

A new entity could be created through a cooperative agreement between the counties. A new agency may require a board of directors or oversight committee to set policy, oversee operations, and respond to community and rider needs.

Opportunities

- Dedication – A consortium, especially formal, provides a dedicated, single-purpose entity to plan and develop the transit corridor program. This can result in a more focused agency and a better project delivery.
- Expertise – As a dedicated agency, the staff will eventually become expert in the corridor and its service characteristics.
- Rider experience – This option offers a seamless experience for riders in terms of fare collection, readability of signage, and system identity.
- Integrated operations – The delivery of the service will be integrated in both counties.

Challenges

- Adds another transit agency
- Potential conflicts with local operators regarding funding
- Planning and schedule integration with local system
- Duplicative and does not take advantage of efficiencies that come from working with existing agencies

7.1.9.5 Consolidated Bi-County Transit Entity (including the BRT system)

A consolidated entity comprising the existing county transit operators (TOR and Bee-Line) could be created through a cooperative agreement between the counties. Consolidating operations could promote operational and management efficiencies and cut costs.

Opportunities

- Shared services – A new, consolidated entity could merge bus operations in the two counties, helping to create seamless connections between local bus services and the BRT.
- Lower costs – Governmental consolidation has proven to be an effective means of cutting costs and potentially saving taxpayer money through the sharing and distribution of resources.
- Experience – A consolidated agency, composed of existing staff from both counties, can retain the ability to effectively serve travelers in the corridor.
- Rider experience – This option offers a seamless experience for riders in terms of fare collection, readability of signage, and system identity.
- Integrated operations – The delivery of the service will be integrated in both counties.

Challenges

- Consistency – Interrupting current and historic institutional relationships could result in disruptions in passenger service during a transition period and perhaps even longer.
- Integration – Establishing the groundwork for consolidation and integration will take time and effort to determine the optimal institutional structure.

7.2 Mid-Term Transit Recommendations

Mid-term transit recommendations are those that are recommended for up to 15 years following completion of the NNYB. (See Figure 47 for a regional map pinpointing the locations of recommended mid-term transit improvements.) These items pivot off of the areas for further evaluation in the short-term and other needs identified by the MTTF that could not be feasibly addressed or implemented in the short-term due to planning and engineering needs, cost, funding/financing challenges, environmental study, and required approvals, among other constraints.

Generally, the mid- to long-term transit recommendations include a series of capital-intensive infrastructure projects that may not be implemented until transit demand grows and funding becomes available.

7.2.1 Projects

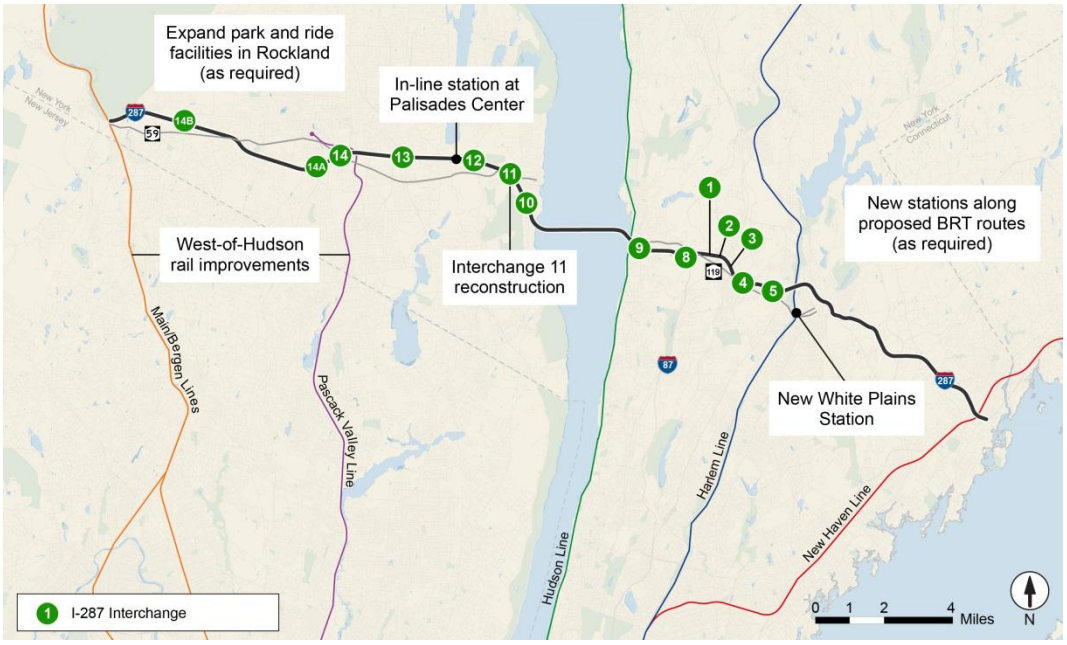

Figure 47: Proposed mid-term transit improvements

7.2.1.1 White Plains Station Redevelopment

What is it?

This phase of the White Plains Station project would implement the recommendations of the station planning efforts that will take place as a result of the $1 million MHREDC grant (see Short-Term Recommendations). Implementation activities would include a full reconstruction of the station to better facilitate passenger movements by bringing transit modes closer to each other. A new station would also enhance the passenger experience by creating a more welcoming gateway to the City with a larger facility, shopping, and improved connections between the station and the surrounding community.

Where will it go?

White Plains Metro-North Train Station and vicinity

Why is this important?

In order to achieve the recommendations of the station area improvement plan, build a new multimodal transit center, and create a new, pedestrian-friendly, sustainable community that is centered on transit in the western portion of downtown White Plains.

7.2.1.2 Interchange 11 Reconstruction

What is it?

Congestion on Route 59 in the vicinity of Interchange 11 in Nyack is particularly bad during the AM and PM peak periods, when demand for access to I-287/87 is greatest. Contributing to congestion in this area is the layout of the interchange; multiple on- and off-ramps connecting to and from I-287/87 are stretched over a half-mile section of Route 59. Traffic moving to and from these ramps causes backups on Route 59. Recommended short-term improvements like traffic signal re-timings on Route 59 will help to improve congestion around Interchange 11, but to address the problem in a more comprehensive manner, the overall design and operation of the interchange should be reviewed, and a new interchange should be designed and built.

Where will it go?

Interchange 11 in Nyack (See Figure 48)

Why is this important?

The reconfiguration of Interchange 11 will improve access to/from I-287/87 as well as traffic along Route 59.

Figure 48: Interchange 11

7.2.1.3 West-of-Hudson Rail Improvements

What is it?

Rockland County currently does not have direct rail service to Manhattan. Existing commuter rail – while improved in recent years – is still limited compared to other rails lines in the region. Additional improvements that increase service, make trains faster, and provide better connections to New York City would not only offer current Manhattan-bound commuters a better ride experience but also open up Rockland County and its residents to new jobs and economic activity. The MTTF is recommending that MNR and NJT work collaboratively to continue making improvements to existing rail service in the West-of-Hudson service area.

Where will it go?

Rockland County and the State of New Jersey (See Figure 49 for the existing West-of-Hudson rail alignments in Rockland County and northern New Jersey.)

Why is this important?

To better serve riders using the West-of-Hudson rail lines through increased express services, faster rides, and better overall access to/from New York. Improved rail service would leverage existing infrastructure to help spur growth in Rockland County.

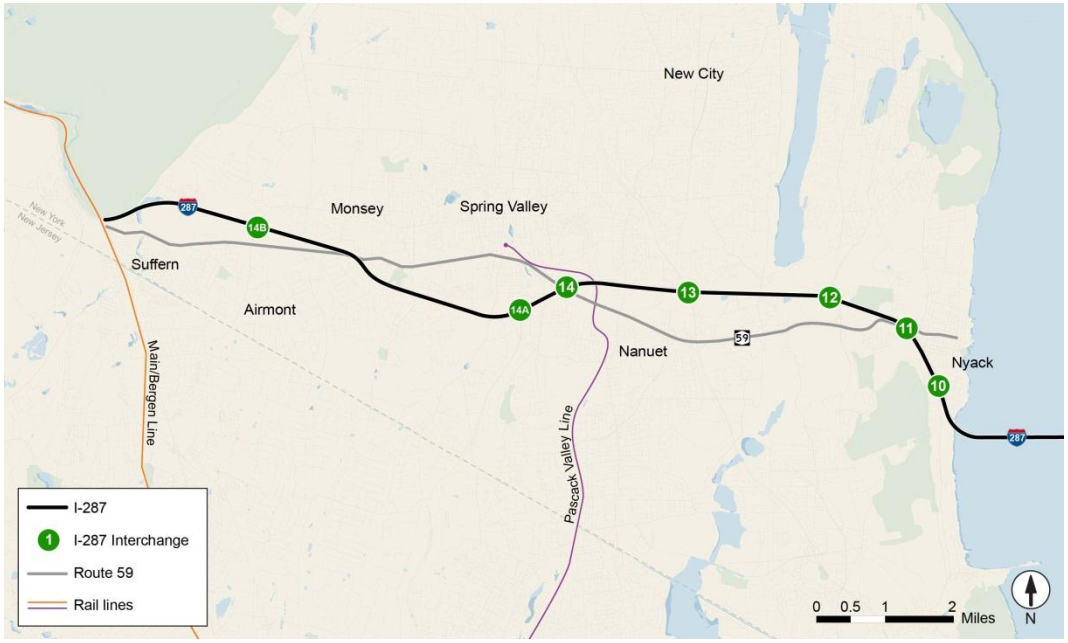

Figure 49: Rockland County is served by the Main/Bergen and Pascack Valley lines.

7.2.1.4 In-line BRT Station at the Palisades Center

What is it?

A high-quality, full-service transit station could be built in the median of I-287/87 near the Palisades Center park and ride (Lot J). A station at this location would provide significant time savings for passengers because it would keep buses on I-287/87 and prevent them from having to exit the highway and take a circuitous route to and from Lot J to pick-up and drop-off passengers. Passengers would access the station via a pedestrian bridge spanning I-287/87. The in-line station would have all the same amenities as the other BRT stations (real-time bus arrival information, Wi-Fi, ticket machines, etc.). In planning the station, further discussions with transit experts and local and state officials should take place to ensure that local community needs are addressed.

Where will it go?

Center median of I-287/87 near the Palisades Center, with a pedestrian bridge connection to the commuter park and ride at Lot J. (See Figure 50 for a photo showing an in-line BRT station on a highway.)

Why is this important?

To create a new, convenient stopping point for buses at one of Rockland County's key park and ride locations that will greatly reduce travel times for buses by keeping them on I-287/87.

Figure 50: "In-line" BRT stations like this one on I-35 in Minneapolis allow highway-running buses to stay on the highway to pick up and drop off passengers. (Source: Andrew Tucker)

7.2.1.5 New BRT Stations Along the Proposed Routes

What is it?

As demand and ridership grow throughout the new BRT system, the operating agency, in conjunction with local governments, can introduce additional stations along routes. The particular locations of these new facilities will be determined based on ridership demand along the routes, changes in land-use patterns, and the available space needed to provide stops without compromising the existing service. Input from local communities and officials will also be critical.

Where will it go?

Along the proposed BRT routes in Rockland and Westchester Counties

Why is this important?

A successful system must provide transit service where people and jobs are located. In the future, ridership demand may grow in specific activity areas along the routes and the new BRT needs to respond to this.

7.2.1.6 Expanded Park and Ride Facilities in Rockland County

What is it?

Park and ride facilities serve dispersed land uses well by collecting people from multiple origins and congregating them in a single location served by transit. From there, travelers can board buses that serve the park and ride location to access their final destinations. Park and ride facilities should provide a safe, attractive, and comfortable environment for users.

Where will it go?

Park and ride facilities are widely used throughout Rockland County. Plans for expansion of existing lots or development of new lots will be determined by available space and demand.

Why is this important?

During the week, demand outstrips supply; a trend that is likely to continue in the future. Therefore, additional and/or expanded park and ride facilities will likely be required in the future to accommodate increased demand driven by the new regional transit service.

7.3 Long-Term Transit Recommendations

Taking a longer-range view, the MTTF has recommended the following projects for implementation 15 years or more following completion of the NNYB:

- Passenger Service on the West Shore Line
- East-West Rail Options (Light Rail or Commuter Rail)

These recommendations stem from the short- and mid-term recommendations and represent an evolution of the region's transit system. This evolution could take the form of a more robust and sophisticated BRT system or a possible conversion to rail-based transit at some point in the future. (See Figure 51 for a regional map highlighting the recommended long-term transit improvements.)

7.3.1 Projects

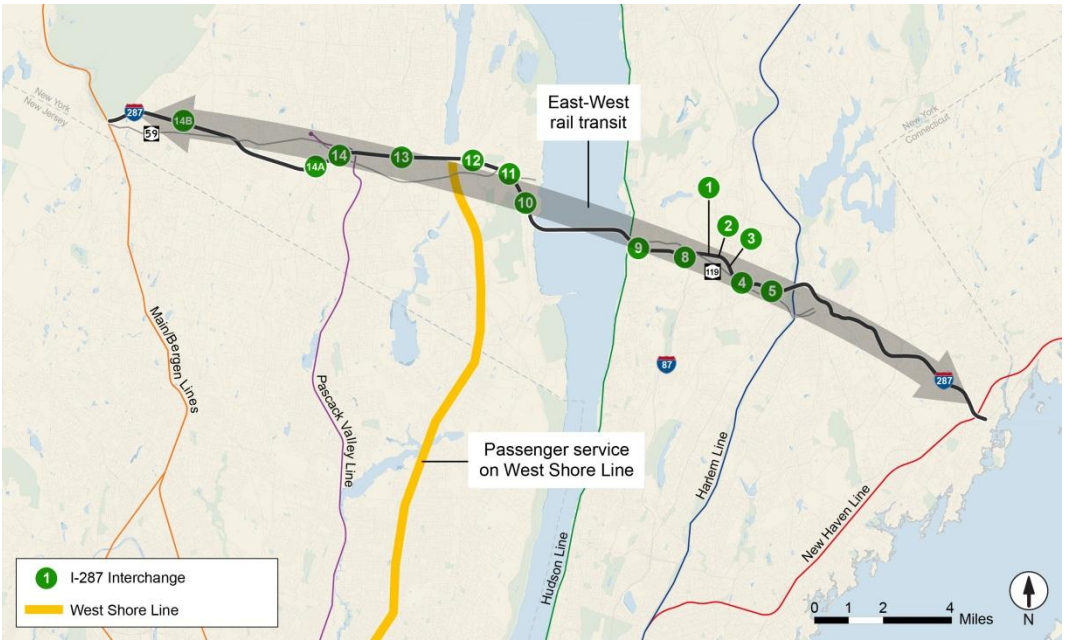

Figure 51: Proposed long-term transit improvements

7.3.1.1 Passenger Service on the West Shore Line

What is it?

The introduction of passenger rail service to the 31-mile, CSX-owned West Shore Line was discussed in detail by the MTTF. Members agreed that preliminary discussions should take place in the short-term among a variety of stakeholders needed to make this project happen, including CSX, NYSDOT, MNR, and NJT. In the long-term, the MTTF recommends active passenger service on this line.

Where will it go?

West Shore Line in Rockland County and the State of New Jersey

Why is this important?

To introduce a new north-south passenger rail connection to a portion of eastern Rockland County that currently lacks passenger rail service. Once the Gateway Tunnel opens, the West Shore Line, along with the Pascack Valley, Main/Bergen, and Port Jervis Lines, will create new opportunities for “one-seat” rides into Manhattan.

7.3.1.2 East-West Rail Options (Light Rail or Commuter Rail)

What is it?

The MTTF recommendations do not preclude the establishment of light rail or commuter rail in the corridor in the long-term. The MTTF considered both modes, but, due to capital costs and the time needed to implement the service, rail was eliminated as a short- or mid-term transit mode.

The MTTF recognizes that the NNYB is being built to structurally support rail transit. Commuter or light rail could benefit the region at some point in the future if the population grows and demand warrants. Therefore, it is not precluded as a future transit option and should be studied in greater detail as conditions prescribe.

Where will it go?

Westchester and Rockland Counties

Why is this important?

To meet increased travel demand and take advantage of the design and engineering of the NNYB, which is being built to physically support rail transit.

7.4 Ideas Considered but Not Included in Final Recommendations

Throughout deliberations, the MTTF discussed several ideas for improving transit in the region, including alternative modes. The following ideas were considered and debated, but eventually eliminated from further consideration.

7.4.1 Direct Tarrytown Access through Infrastructure

A proposal to create some form of direct connection between I-287/87 and the MNR station in Tarrytown has been discussed by the MTTF and in prior planning efforts. This connection would facilitate transfers between the east-west running BRT service and the north-south running MNR rail service by providing a more direct and potentially faster link between the highway and train station. Under current conditions, buses accessing the train station must do so via local roads through the Village.

A number of concepts for a “Tarrytown Connector” were considered:

- a bus-only exit ramp from I-287/87 near the NNYB bridge landing in Tarrytown to a ramp structure that would run parallel to the MNR Hudson Line tracks and descend to grade as it approaches the vicinity of Tarrytown Station. This would provide a dedicated, transit-only ROW between the highway and station.
- a new, vertical, intermodal transit station located near the NNYB bridge landing in Tarrytown. At the top, near the bridge landing, would be a bus station serving both local and BRT routes. At the bottom, along the Hudson Line tracks, would be a new MNR train station. Elevators would connect both stations and provide a means of transferring between bus and rail modes. Such a facility has been called a “drop-down” station because passengers would use the elevators to descend to the new MNR station.
- a moving walkway that would connect a new bus station located at the NNYB bridge landing in Tarrytown and the Tarrytown MNR station. This idea is similar in concept to the “drop-down” station in that bus passengers looking to access the Tarrytown MNR station would descend via escalators to track level where they would find a moving walkway which could be used to travel the roughly 3,300 feet to the MNR station.[4]

Ultimately, the idea of a Tarrytown Connector was eliminated from further consideration for two main reasons: cost and anticipated use. It was determined that the facility’s capital costs would outweigh the benefit to the

[4] This would represent the longest moving walkway in the world.

limited number of daily facility users. Under the current transit proposal, service to Tarrytown would be provided during peak periods only. Therefore, it has been agreed that the money used to build a Tarrytown Connector could more effectively benefit the region if directed to corridor infrastructure projects that improve travel conditions for all system users, not just the subset traveling to and from the Tarrytown MNR Station.

7.4.2 Trans-Hudson Ferry Service

The MTTF discussed the possibility of introducing ferry service between Nyack and Tarrytown or New York City as a means of removing cars from the NNYB and providing a direct connection between Rockland County and key destinations on the east side of the Hudson, like the Tarrytown MNR station and/or New York City.

However, ferry service and any related planning activities were eliminated from further consideration by the MTTF for several reasons including historic low ridership, high fuel costs, high government subsidies, and cold-climate service interruptions.

The MTTF reviewed past studies and examples of local ferry service. In 1996 NYSTA commissioned a study of Nyack-based ferry service. One proposal was to run peak hour service with 30-minute headways between Nyack and West 38th Street in Manhattan, with one stop in Yonkers. Parking was required in Nyack to support riders, but a proposal to build a parking garage was rejected due to local opposition.

In September 2007, New York Water Taxi began offering trips from Haverstraw to Pier 11 in Lower Manhattan, with a stop in Yonkers, but the service was abandoned after less than two years. While the ferry offered a “one-seat ride” to Manhattan with passenger amenities (complimentary coffee, flat-screen TVs, etc.), ultimately high fuel costs, low ridership, and reliance on an unsustainable subsidy from local governments led New York Water Taxi to discontinue the service in May 2009.

Currently, the only Rockland-based ferry still in operation is the Haverstraw – Ossining service run by NY Waterway, which provides a connection to MNR’s Hudson Line in Ossining.

7.4.3 Transit Service to Stewart Airport

Transit service via bus or rail to Stewart Airport in New Windsor, NY (Orange County) had been brought up in deliberations but was rejected as a particular MTTF recommendation because alternatives and overall feasibility are currently being studied by MNR.

7.4.4 Monorail

Monorail had been suggested as a potential regional transit mode in the mid- to long-term. Monorail is a rail based system whereby trains are carried on a single ("mono") rail. The rails are typically elevated. There are few urban monorail systems in North America; in the United States, many are used mainly for tourist purposes and are therefore not considered "true" transit modes.

While monorail has merits, it was rejected at the August 2013 meeting of the MTTF for the following reasons:

- Cost – Due to elevated infrastructure, including stations with substantial vertical circulation and fire and life safety systems, costs per mile can run into the tens or hundreds of millions.
- Visual impact – The elevated infrastructure common to monorail can create significant visual impacts in communities. Elevated stations, in particular, can be rather large structures due to the vertical circulation and fire/life safety components required for operations and service.
- Operating and maintenance challenges – Many monorail systems are proprietary, with customized parts and vehicles, which makes servicing and operations reliant on a single operator or manufacturer.

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8 Funding and Financing Options

The MTTF recognized that whatever the recommendations brought forward the funding would need to be secured for both capital and ongoing operating expenses. Therefore, the MTTF formed a Finance Subcommittee to explore opportunities to fund and finance transit proposals made for the I-287 corridor. A variety of methods for financing and funding transit projects were investigated to help inform them as they worked to identify ways to pay for the I-287 corridor transit recommendations. A wide variety of options were considered in the hopes of developing robust and reliable funding options that could effectively attract increasingly scarce and highly sought-after federal funds. The MTTF identified opportunities for federal, state, and local funding and financing sources.

This section contains a number of the sources and strategies which the MTTF Finance Subcommittee explored. The sources are grouped into two categories: Federal Funding Sources Authorized in the most recent transit bill and State and Local Funding/Financing Sources. More information on all of these can be found in Appendix E**.**

8.1 MTTF Finance Subcommittee

The MTTF Finance Subcommittee, chaired by Larry Salley, consisted of members of the MTTF and representatives from NYSDOT, NYS, NYSTA, NYS Governor's Office, Westchester County and Rockland County.

Members of the Finance Subcommittee included:

Name	Title	Affiliation
David Auckland	Member of Tarrytown Planning Board	Delegate for Mayor Drew Fixell
Ed Burroughs	Planning Commissioner, Westchester County	Delegate for County Executive Rob Astorino
Harriet Cornell	County Legislator	Rockland County Legislature, District 10
Ellen Jaffee	Assemblywoman	New York State Assembly, District 97
Naomi Klein	Director of Planning, Westchester County Department of Public Works and Transportation	Attendee

Name	Title	Affiliation
Tom Madison	Executive Director	New York State Thruway Authority
Joan McDonald	Commissioner	New York State Department of Transportation
Karen Rae	Deputy Secretary of Transportation	New York State Governor's Office
Larry Salley	Former Westchester County Transportation Commissioner, Finance Subcommittee Chair	Westchester County
Christopher St. Lawrence	Town Supervisor	Town of Ramapo
Veronica Vanterpool	Executive Director	Tri-State Transportation Campaign
Thomas Vanderbeek	Commissioner of Planning and Public Transportation, Rockland County	Delegate for County Executive Scott Vanderhoef
Jeff Zupan	Senior Fellow, Regional Plan Association	Delegate for Bob Yaro

The Finance Subcommittee convened on the following dates:

- April 30, 2013;
- May 9, 2013; and
- September 19, 2013.

At the April 30 and May 9 meetings, specific funding sources were presented and discussed in order to develop a menu of options for further consideration by the MTTF. A few themes emerged from the Finance Subcommittee meetings with regard to transit funding:

- Federal and state transit dollars are increasingly scarce and highly competitive. Maintenance and rehabilitation required for deteriorating existing infrastructure, the need for new transit systems, and an economy that is still recovering have all resulted in an environment where federal and state funds are severely strained. Additionally, it will be difficult to redirect funds from existing projects and services to fund new transit service.
- To successfully attract federal transit funds, a robust local match, usually at a minimum 4-to-1 ratio, must be identified.

- Local funding should comprise a variety of sources that reduces risks and doesn't overburden any particular communities in Rockland and Westchester Counties.
- To create an appetite for transit investment in the region, any new sources of revenue must be linked to benefit.

The Finance Subcommittee concluded that it was important for the MTTF to provide the full menu of funding and financing options in the final recommendations. It was acknowledged by the MTTF that the funding mechanisms utilized will be determined by which recommendations are implemented and what form the operating and management structure takes. Therefore, the MTTF recommends that NYSDOT, NYSTA, Westchester County, Rockland County, and MTA convene a working group to determine the best implementation plan, organizational structure, and financing needs and sources.

8.2 Federal Funding Sources

The most recent federal transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21), was signed into law in July 2012. It is the first surface transportation funding and authorization bill passed since SAFETEA-LU in 2005. MAP-21 funds surface transportation programs at $105 billion for fiscal years 2013 and 2014, for an annual funding of approximately $52 billion. MAP-21 provides $10.578 billion for transit in FY2013 and $10.695 billion in FY2014, or 20 percent of the total funding under the Act. Although MAP-21 appropriations for FY2013 and FY2014 to states are not yet known, New York State received $1.5 billion in federal funding from FTA programs under SAFETEA-LU, representing approximately 13 percent of the national funds distributed under these programs.[5]

MAP-21 emphasizes performance and outcome-based programs, stating that resources will be invested in projects that make progress towards established goals including safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and reduced project delivery delays.

This section provides a brief list of options available through the federal government. More detail on specific federal funding programs can be found in Appendix E.

Federal programs generally can be grouped into four categories:

- Formula Grants
- Competitive Grants

[5] Federal Transit Administration. Funding by State. http://www.fta.dot.gov/12853_88.html (accessed March 2013).

- Flexible Federal Highway Funds
- Federal Loans

8.3 State and Local Funding/Financing Sources

Federal transit funds must be matched with local, regional or state funds, usually at a minimum of a 4 to 1 ratio. This section provides simple lists of financing and funding options available through state and local governments that can be used to support transit projects or to attract federal funding. [6, 7, 8]

This section provides a list of options available through state and local sources. More detail on specific programs can be found in Appendix E.

State and local governments can **finance** transit infrastructure through a variety of means, including:

- General Obligation Bonds:
- Revenue Bonds
- Tax Increment Bonds
- State Lottery Bonds
- Grant Anticipation Revenue Vehicles (GARVEE)
- Grant Anticipation Notes (GANs)
- Public-Private Partnerships

State and local governments can **fund** transit infrastructure through a variety of means, including:

- Fare Revenues
- Local Option Taxes
- Special Assessments
- Motor Vehicle Fees
- Parking Fees
- Fuel Taxes
- Transaction Taxes
- Tolls
- Development Contributions
- Right of Way and Property Contributions

[6] Transportation for America. "Thinking Outside the Farebox: Creative Approaches to Financing Transit Projects." Washington, DC, 2012.

[7] United States Department of Transportation Federal Highway Administration. "Project Finance Primer." Washington, DC, 2010.

[8] Transit Cooperative Research Program. *TCRP Report 129 Local and Regional Funding Mechanisms for Public Transportation.* 2009.

9 Conclusion

Governor Cuomo's commitment to delivering real mass transit options for the people and businesses of the Lower Hudson Valley led to the creation of the Mass Transit Task Force. The MTTF offered leaders in Rockland and Westchester Counties a unique opportunity to gather and prepare a set of transit recommendations for the I-287 corridor that best suits their needs. The MTTF members, representing different interests, communities, and concerns, rose to the challenge of meeting the larger regional needs, while recognizing that all individual ideas may not be integrated into the final proposal. This collective effort resulted in a set of consensus recommendations supported by all participating members.

Providing meaningful mass transit choices in the Lower Hudson Valley will improve mobility within the region, support regional aspirations for sustainable growth, enhance access to major employment centers and allow for their growth, and increase the resiliency and redundancy of the transportation network in the region.

The Co-Chairs of the MTTF, NYSDOT Commissioner Joan McDonald and NYSTA Executive Director Thomas Madison, are deeply grateful for the time and effort contributed by each MTTF member, their staff and delegates, and the broader community. The recommendations put forth by the MTTF will address the transit needs of the Lower Hudson Valley today and those of future generations to come.

10 List of Abbreviations

AA	Alternatives Analysis
ADT	Average Daily Traffic
AJR	Access Justification Report
BRT	Bus Rapid Transit
CBD	Central Business District
CMAQ	Congestion Mitigation and Air Quality
CRT	Commuter Rail Transit
DEIS	Draft Environmental Impact Statement
DUA	Dwelling Units per Acre
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GCT	Grand Central Terminal
HIR	Highway Improvements Report
HOT	High Occupancy Tolls lanes
HOV	High Occupancy Vehicle lanes
I-287	Interstate 287
LEHD	Longitudinal Employment Household Dynamics
LODES	Longitudinal Origin-Destination Employment Statistics
LOS	Level of Service
LRT	Light Rail Transit
MAP-21	Moving Ahead for Progress in the 21st Century
MPO	Metropolitan Planning Organization
MTA	Metropolitan Transportation Authority
MTTF	Mass Trans Task Force
MNR	Metro-North Railroad
NJT	New Jersey Transit
NNYB	New New York Bridge

NYCT	New York City Transit
NYMTC	New York Metropolitan Transportation Council
NYP	New York Penn Station
NYS	New York State
NYSDOT	New York State Department of Transportation
NYSTA	New York State Thruway Authority
OWL	Orange Westchester Line
PABT	Port Authority Bus Terminal
PATH	Port Authority Trans-Hudson
RHTS	Regional Household Travel Survey
RFP	Request for Proposals
ROW	Right of Way
STP	Surface Transportation Program
TAOR	Transit Alignment Options Report
TAZ	Traffic Analysis Zone
TDM	Transportation Demand Management
TIFIA	Transportation Infrastructure and Finance Innovation
TMC	Transportation Management Center
TMSR	Transit Mode Selection Report
TOD	Transit-Oriented Development
TOR	Transport of Rockland
TRIPS	Transportation Resources, Intra-county, for Physically Disabled and Senior Citizens
TSM	Transportation System Management
TSP	Transit Signal Priority
TZB	Tappan Zee Bridge

11 List of Appendices