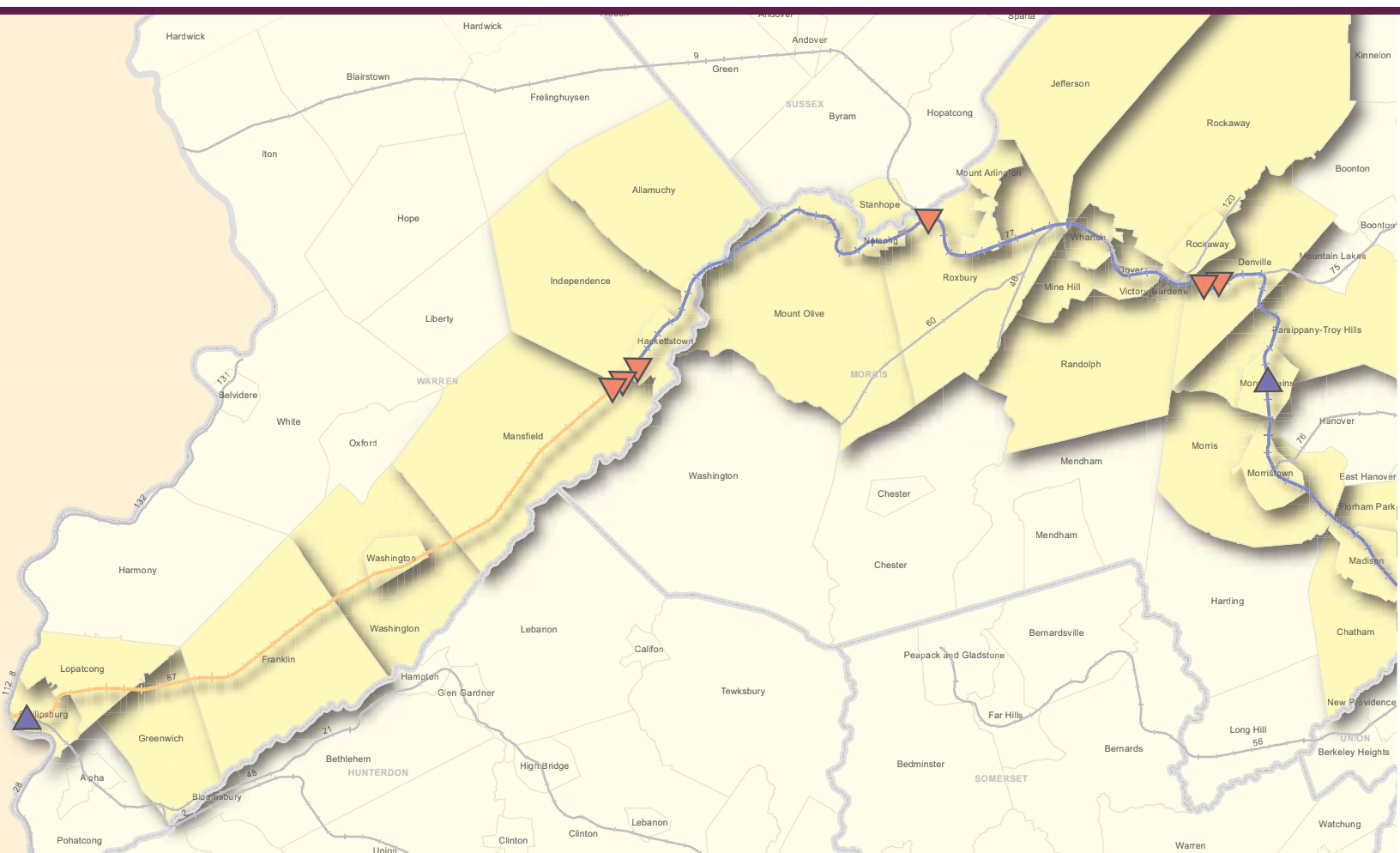




Morris/Warren County Rail Corridor Study



July 2013

JACOBS **PARSONS BRINCKERHOFF**

A. Strauss-Wieder, Inc.
Analyses for informed decision making



ACKNOWLEDGEMENTS

Special acknowledgement and thanks to the following Technical Advisory Committee members and Project Stakeholders who provided data and input throughout the preparation of this study

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Mansfield Township

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BASF Corporation

Colgate-Palmolive

Holland Manufacturing Co, Inc.

M&M Mars

NYK-Yusen Logistics

Berry Plastics, Corp

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Disclaimer

The preparation of this report has been financed in part by the U.S. Department of Transportation, North Jersey Transportation Planning Authority, Inc., Federal Transit Administration and the Federal Highway Administration. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or its use thereof.

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The North Jersey Transportation Planning Authority is the federally authorized Metropolitan Planning Organization for 6.6 million people in the 13-county northern New Jersey region. Each year, the NJTPA oversees more than \$2 billion in transportation improvement projects and provides a forum for interagency cooperation and public input into funding decisions. It also sponsors and conducts studies, assists county planning agencies and monitors compliance with national air quality goals.

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I. EXECUTIVE SUMMARY

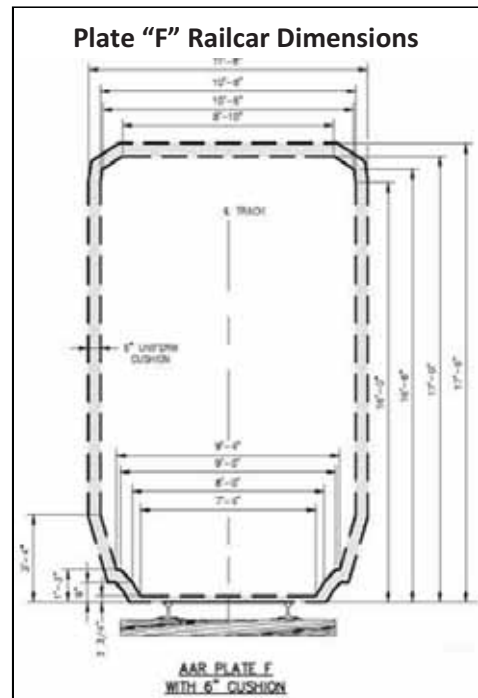
A. Purpose and Need

Investment in New Jersey's transportation infrastructure to provide state of the industry freight rail service is an investment in jobs, growth and economic vitality.

Northern New Jersey has a robust freight rail system, including three Class I railroads (Norfolk Southern, CSX and Canadian Pacific), several Class II and III railroads, and a number of short-line, switching, and terminal railroads. Historically, the State of New Jersey was heavily industrialized, and served by an extensive port and freight rail network. Over the years, as industries moved out of New Jersey, the demand for rail service to supply local manufacturing operations declined. Miles of freight railroad were simply taken out of service, while many more miles of freight rail right of way were sold off and converted to other uses. The remaining freight rail network continues to support movements to and from New Jersey but is no longer as capable of supporting movements within the state as it once was. Investment and upgrading of many of the rail lines serving New Jersey businesses have failed to keep pace with the evolving demands of rail served industries.

On November 21, 1994, the Association of American Railroads (AAR) issued a new standard ("S-259") which increased the maximum gross-weight-on-rail (empty weight of the rail freight car plus the weight of the load/lading therein) allowed per car from 263,000 pounds ("263K") to 286,000 pounds ("286K").¹ The 286K standard became effective on January 1, 1995.

The significance of the 286K standard is that it encouraged the evolution and use of larger freight cars (Plate "F" Railcars), which improved the operating efficiency of railroads and created transportation and material handling efficiency opportunities for rail customers. Cars with larger weight and/or cubic capacities allow railroads to carry the same amount of freight with fewer cars and in fewer shipments, thereby



¹ Rader and Gagnon, *Maximizing Safety and Weight: A White Paper on 263K+ Tank Cars*, September, 1999 (available on the Federal Railroad Administration website).

increasing productivity by increasing the amount of freight that can be moved by a railroad *without* increasing the amount of labor or motive power required to move it.

The common boxcar of 1981 could carry 77 tons, while its 2009 counterpart could carry 110 tons. Larger cars present rail customers with the opportunities to buy and ship in larger quantities per car thus lowering shipping and handling costs. The 286K standard has been recognized by the Federal government and referenced in material published by the Federal Railroad Administration (FRA). The industry moved quickly to adopt the standard, with the average weight per railcar load increased since the 286K standard was implemented.

Businesses located along rail lines that are restricted from carrying 286K railcars are at a competitive disadvantage. With operating margins shrinking and an increasingly competitive national and world marketplace, industries seeking to increase (or at least maintain) margins often make the decision to relocate to areas that are served by 286K capable rail lines. This has resulted in a leakage of industrial activity and jobs from certain areas of New Jersey, often to adjoining states. Discussions with railroad operators and users indicate that industrial sites without 286K access or vertical constraints that prohibit the use of Plate “F” railcars are no longer considered competitive for businesses or industries that require rail service.

B. Goals and Objectives of the Study

Upgrading key rail corridors to accommodate 286K railcars with heights up to 17'-0" (Plate “F”) is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (RTP) (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height

“Achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.”

restrictions throughout the NJTPA region. These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

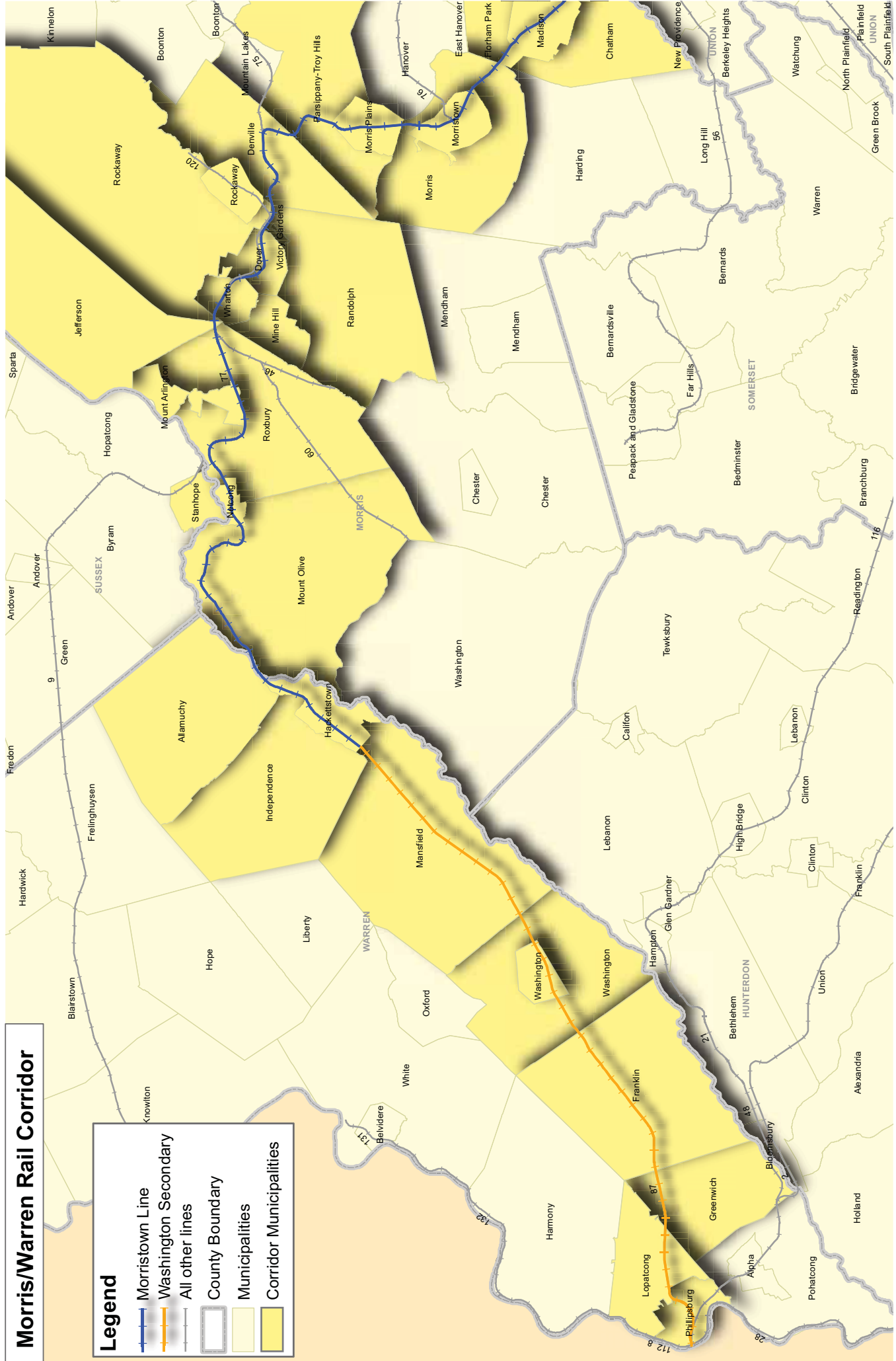
In support and advancement of these overarching goals, the North Jersey Transportation Planning Authority (NJTPA) initiated this study of the primary rail freight corridor serving Morris and Warren Counties. The Corridor consists of Norfolk Southern’s Washington Secondary Line

between Phillipsburg and Hackettstown in Warren County and NJ TRANSIT's Morristown Line from Hackettstown to Morristown in Morris County (Figure I.1). The study builds upon the findings of the previously completed "*Morris County Freight Infrastructure and Land Use Analysis*" study which noted that there are a number of constraints on the Corridor in Morris and Warren Counties that limit the ability of the freight railroad industry to serve the region.

This study examined infrastructure and operational improvements necessary to accommodate taller and heavier railcars, the potential for improved freight rail access to stimulate industrial development along the Corridor and the economic impacts of that development. Key work tasks included:

- Collection and validation of dimensional data and existing physical infrastructure conditions along the Corridor
- Identification of vertical and horizontal clearance and weight constraints and potential improvements
- Assessment of economic impacts and potential for new development in Warren and Morris Counties

Figure I.1 - Morris/Warren Rail Corridor



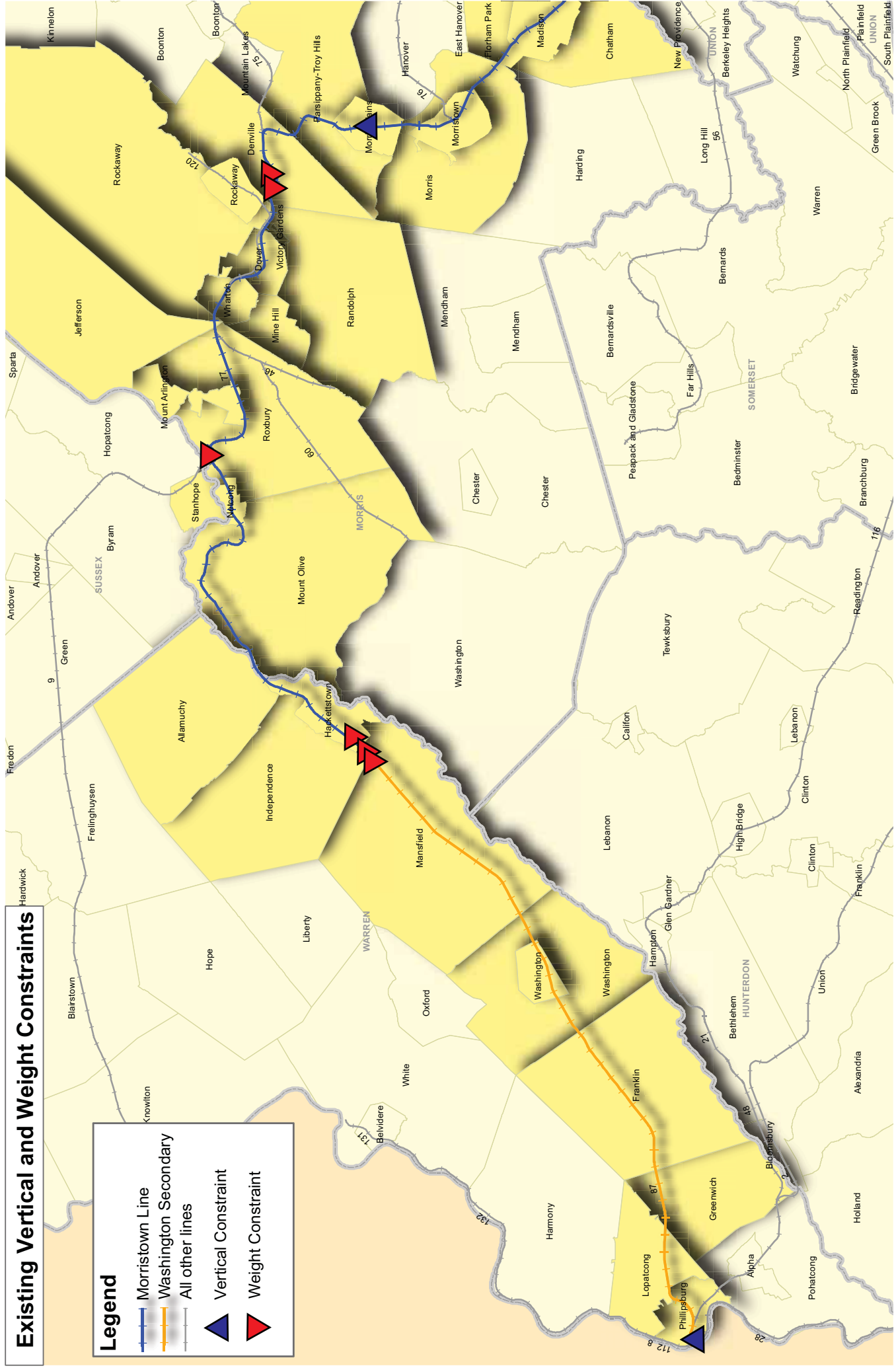
Low vertical clearances due to overhead bridges and catenary structures limit the size of the railcars that can be used to serve customers in the two counties. Vertical clearances along the Corridor prevent the movement of Plate “F” railcars, a typical standard railcar used throughout the industry having a maximum height above top of rail of 17'-0". The type and condition of undergrade bridges (bridges carrying the railroad over roadways, streams, etc.) along the Corridor present potential limitations to increasing the maximum weight of railcars moved along the Corridor from 263K to the national standard of 286K. These limitations minimize the competitive advantage of existing rail served industries along the Corridor and the other branch lines that are accessed via this route, limiting the ability to retain existing and attract new rail served industries to the region.

Many businesses in the study area rely on rail freight to receive commodities and compete in a global economy. There are currently twenty one (21) active rail customers along the Corridor and the branch lines that are accessed via the Corridor. Some active businesses located along the Corridor previously received rail shipments but no longer do as a result of constraints to the rail system adversely impacting their ability to economically receive these shipments directly by rail. Further, there exist a number of inactive industrial sites along the Corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the Corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Investigation of the infrastructure along the Corridor identified a total of eight (8) constraints to the movement of 286K Plate “F” railcars. Vertical constraints limiting the height of a railcar that can be moved along the Corridor were identified in two (2) locations. The South Main Street Bridge in Phillipsburg has a total vertical clearance of 16'-6", substantially less than the 17'-6" required for a Plate “F” railcar. This is a physical constraint as a result of the height of the bridge structure. An operational vertical constraint exists in Morris Plains, where the catenary infrastructure limits vertical clearance to approximately 17'-2" in the vicinity of the East Hanover Avenue Bridge, even though the bridge itself is high enough to accommodate Plate “F” cars.

Weight limitations were identified at six (6) locations along the Corridor. Railcars are restricted to 263K east of Hackettstown with three (3) deficient bridges located in Hackettstown, one (1) in Roxbury Township and two (2) in Denville. While capable of accommodating a 263K railcar, these bridges have been determined to be structurally incapable of safely accommodating 286K railcars. These constraint locations are shown on Figure I.2.

Figure I.2 – Existing Constraints to 286K, Plate “F” Rail Service



C. Current Freight Rail Service on the Corridor

Despite of the vertical clearance and weight limitations, the Corridor is an active and vital line serving industries in Morris and Warren counties and beyond. For the most part, deliveries (loaded moves) are made from west to east, with empty rail cars delivered east to west. Between Phillipsburg and Morristown, local freight service is provided by Norfolk Southern (NS) from Allentown Yard in Pennsylvania. Inbound service is operated to Washington Yard where connection is made to another NS local freight train based out of Dover. The Dover local operates to and from Washington Yard, serving customers en route and interchanging cars with the Morristown & Erie Railway (M&E) at Lake Junction in Roxbury Township. M&E crews provide switching service to customers on a number of branch lines accessed via the Corridor, including:

- High Bridge Branch
- Chester Branch
- Dover and Rockaway Branch (D&R Branch)
- Whippany Line

Freight service is also provided from the Corridor to the Montclair Boonton Line, which also provides NJ TRANSIT passenger rail service between Dover and Hoboken.

NS currently uses the Washington Secondary to serve a total of nine (9) active customers with the M&E serving an additional twelve (12) customers located along the connecting branch lines. As summarized in Table I.1, NS and M&E deliver approximately 2,265 loaded railcars annually along the Corridor.

Table I.1 - Existing Customers and Volume

SERVICE AREA	CUSTOMERS	ANNUAL VOLUME-REVENUE CARS (1)
Washington Secondary - Phillipsburg to Washington	2	665
Washington Secondary - Washington to Hackettstown	2	730
Morristown Line - Hackettstown to Morristown	3	70
NS Handoff to M&E at Lake Junction	12 (2)	400
Montclair / Boonton Line	2	400
TOTAL CORRIDOR FREIGHT ACTIVITY	21	2,265

(1) Does not include return of empty railcars

(2) M&E provides switching service to 12 customers along 4 branch lines

D. Impact of Existing Constraints on Rail Served Industries

Due to the vertical constraints and the weight restricted bridges along the Corridor, a majority of these revenue cars are short loaded to maintain weight below 263K, or utilize specially designed railcars that can fit beneath the vertical constraints. For example, lumber companies have been using atypical lumber cars with lower center beams to fit under the vertically constrained bridges. Based on discussions with the railroads and the customers they service, it is estimated that up to 90 percent of the revenue moves on the Corridor are adversely affected by the vertical constraints and weight limitations.

Short loading a railcar represents an inefficiency that increases the total cost to a business or industry for material transport. The ability to increase the volume of heavier commodities in a single railcar delivery by an additional 23,000 pounds would represent an economic advantage to the customers, thereby allowing them to increase their competitiveness in their industry. Vertical constraints, particularly the South Main Street Bridge in Phillipsburg require some customers to utilize special equipment such as lumber cars with a lower center beam. The ready availability of the specially designed shorter railcars can be problematic for some customers increasing the logistical issues and cost associated with utilizing the rail service.

While the existing customers are taking special steps to enable them to continue receiving deliveries by rail, this ability may cease to exist in the near future. Currently, these businesses must utilize Plate “C” railcars that can fit beneath the vertical constraints on the Corridor. Unfortunately, the rail industry is no longer manufacturing Plate “C” box cars. As cars in the current fleet become worn out and no longer repairable or serviceable, the availability of Plate “C” railcars will continue to diminish. Without Plate “C” railcars, the existing rail served businesses will have no alternative but to cease utilizing rail. Some of the businesses interviewed indicated that without at least some form of rail service, they would no longer be able to remain in business in their current location, potentially leaving the area or even the state, taking jobs with them.

E. Findings and Recommendations

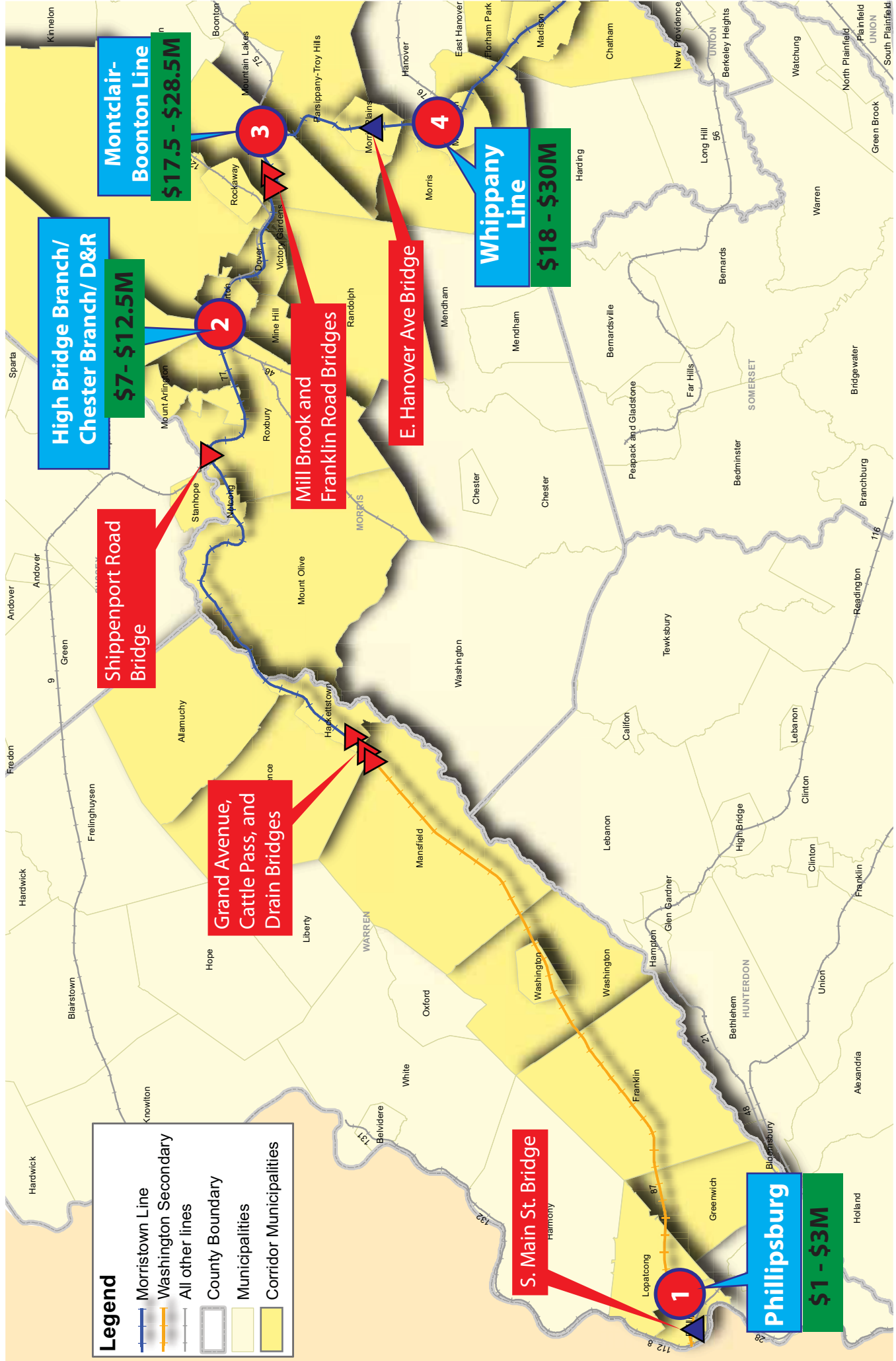
1. Infrastructure Improvements – Capital Need

The study identified a total of eight (8) locations where infrastructure improvements are needed to accommodate 286K Plate “F” railcars. Existing roadway bridges and catenary equipment passing over the rail Corridor represent a vertical constraint At two (2) of these

locations. The remaining six (6) locations consist of bridges carrying the railroad over roadways, streams or utility culverts that are structurally insufficient to safely accommodate today's heavier railcars.

Each of these constraints was investigated to identify improvement alternatives for elimination of the constraint. These alternative improvements were developed at a conceptual level, with further investigation required to support identification of a preferred alternative. Preliminary order of magnitude cost estimates were developed for comparison against the potential economic value of providing 286K Plate "F" service to existing and future businesses. It was estimated that the improvements to eliminate the two (2) vertical clearance constraints and the six (6) weight restrictions would cost between \$18 and \$30 million. The cumulative improvement cost estimates to provide industry standard freight rail access from points west are summarized on Figure I.3.

I.3 - Cumulative Cost Estimates of Improvements Providing 286K Plate "F" Railcar Access to Key Junctions



2. Economic Benefit of Improved Rail Access and Industrial Development

The attraction of new and expansion of existing industrial development along the Corridor holds the potential to generate significant economic value in the form of jobs and tax revenues. Through a detailed screening process, the study identified four (4) property clusters located along and proximate to the Corridor that were deemed to have a high potential for rail served industrial development. These properties generally consist of previously developed and underutilized properties, several of which are already the subject of investigation by the host municipality or the property owner for potential redevelopment. As summarized in Table I.2, these four property clusters hold the potential to house over 10 million square feet of new development including an estimated 3.3 million square feet of rail served industrial uses.

Table I.2 - Industrial Development Clusters and Potential Development

Development Cluster	Developable Building SF	Percent Attributable to Rail	Total Attributable to Rail
Phillipsburg	2,075,000	57%	1,180,000
Washington	240,000	53%	130,000
Mansfield	770,000	43%	330,000
Roxbury	7,250,000	23%	1,670,000
Total	10,335,000		3,310,000

The potential economic value of 3.3 million square feet of industrial development was projected through the application of the IMPLAN Economic Impact model. The economic benefits were calculated for three distinct geographies: Morris-Warren Counties, the NJTPA region and the State of New Jersey. Table I.3 summarizes the projected annual value in terms of direct and total employment generated, personal income, business activity and local, state and federal tax revenues. On an annual basis, full development of these clusters with activity that is new to New Jersey (i.e.: not relocated from another part of New Jersey) would generate over 5,700 jobs, \$356 million in personal income and \$136 million in local, state and federal tax revenues.

Table I.3 - Economic Value of New Rail Served Industrial Development

Benefit Type	Economic Benefits		
	Morris-Warren Counties	NJTPA Region	New Jersey
Direct employment	3,009	3,009	3,009
Total employment	4,816	5,675	5,718
Personal income (in millions \$)	\$298.59	\$353.74	\$356.41
Business activity (in millions \$)	\$893.20	\$1,059.06	\$1,072.79
State and Local Taxes (in millions \$)	\$41.70	\$50.84	\$51.31
Federal Tax Revenue (in millions \$)	\$70.27	\$83.61	\$85.02
Total Tax Revenue (in millions \$)	\$111.97	\$134.45	\$136.33

Compared to the generation of thousands of new jobs and millions of dollars in personal income and tax revenues, investment of \$30 million in the needed infrastructure improvements is strongly supported. Another consideration – the cost of inaction – further supports investment in the rail infrastructure. Without improvements needed to provide industry standard 286K Plate “F” service, not only will it be more difficult to attract new industrial businesses along the Corridor, but existing businesses that depend upon rail service could ultimately be forced out of business or move to a new location that provides the needed rail service. Table I.4 summarizes the economic impact - lost jobs and loss of business activity – that would result from every 100,000 square feet of warehousing and industrial activity that leaves New Jersey.

Table I.4 - Potential Loss of Economic Value due to Loss of Business Activity in the Region

Benefit Type	Economic Benefits	
	Warehousing	Plastics Manufacturing
Direct employment	(30)	(176)
Total employment	(49)	(299)
Personal income (in millions \$)	\$ (3.00)	\$ (20.33)
Business activity (in millions \$)	\$ (6.51)	\$ (78.58)
State and Local Taxes (in millions \$)	\$ (0.26)	\$ (2.10)
Federal Tax Revenue (in millions \$)	\$ (0.65)	\$ (4.76)
Total Tax Revenue (in millions \$)	\$ (0.91)	\$ (6.87)

II. INTRODUCTION

A. Overview of the Washington Secondary / Morristown Line Corridor

The Washington Secondary / Morristown Line Corridor (Corridor) includes approximately 52 route-miles extending from Phillipsburg to Morristown, and is the primary rail corridor providing freight rail service to Warren and Morris Counties. In addition to serving customers along the line, this Corridor provides access to four (4) Branch Lines, and one (1) NJ TRANSIT passenger line including:

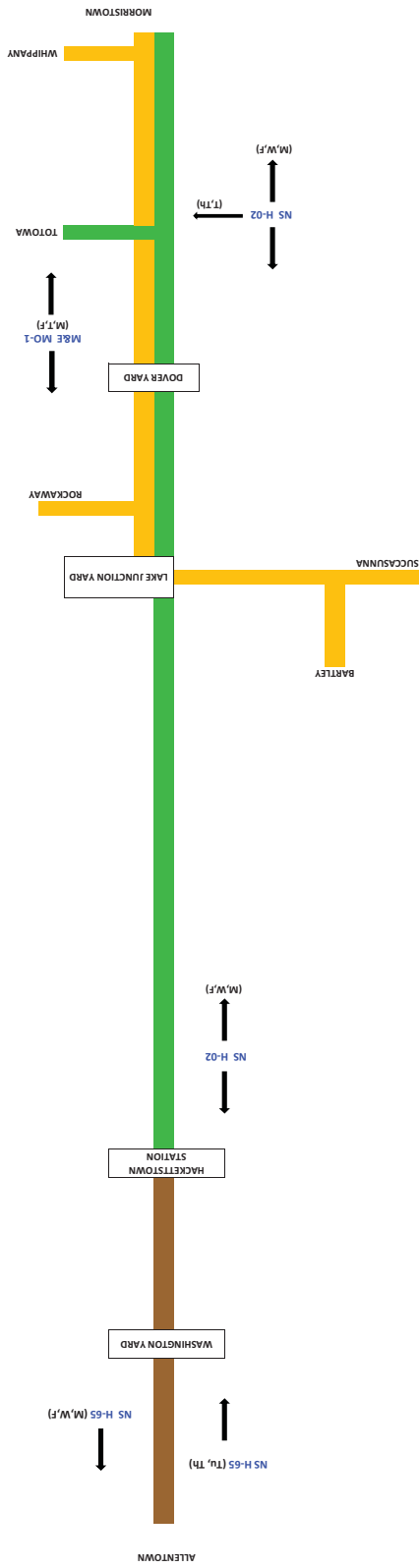
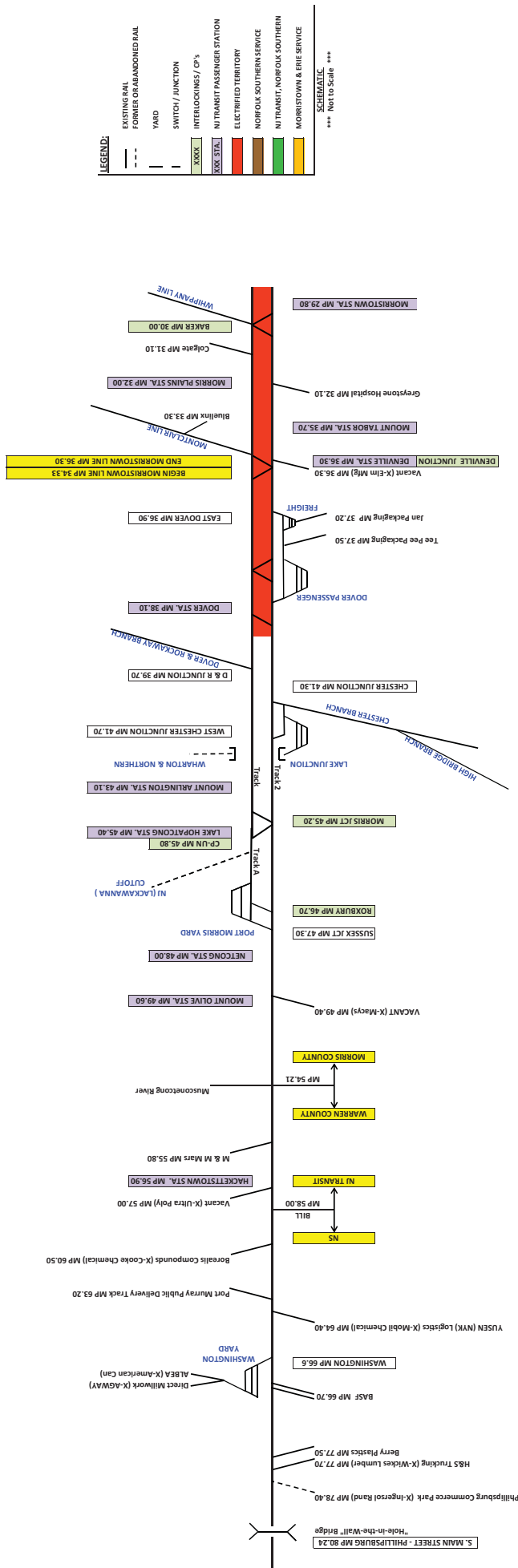
- High Bridge Branch
- Chester Branch
- Dover & Rockaway Branch
- Whippany Line
- NJ TRANSIT's Montclair-Boonton Line

Along this 52 mile corridor, trains pass beneath thirty-two (32) overhead bridges and structures, and cross forty-one (41) undergrade bridges.

Trains destined for the Washington Secondary enter the Corridor from points west via the Lehigh Line as it enters the State crossing the former CNJ Bridge over the Delaware River from Easton, Pennsylvania to Phillipsburg, New Jersey. Between Phillipsburg and Morristown, local freight service is provided by Norfolk Southern (NS) from Allentown Yard on a tri-weekly basis to Washington Yard, where cars are interchanged with another NS local freight train based out of Dover. The Dover local also operates on a tri-weekly basis to and from Washington Yard, serving customers en route and interchanging cars with the Morristown & Erie Railway (M&E) at Lake Junction in Roxbury Township.

M&E crews currently operate only on Monday, Tuesday and Friday, providing service to customers on a number of branch lines and also interchange traffic with CSX Transportation (CSX) at Kearny. In addition to the NS freight service, NJ TRANSIT operates passenger service between Hackettstown and Morristown. Diesel service is provided between Hackettstown and Dover, with electrified service operated between Dover and Morristown, and beyond to Hoboken, NJ and New York City. The general configuration of the Corridor as well as key points along its length is depicted schematically on Figure II.1.

Figure II.1 - General Track Arrangement



B. Current Service on the Corridor

Two (2) vertical constraints and six (6) weight restricted bridges restrict the size and weight of the railcars that can be moved onto and along the Corridor. These constraints are discussed in detail in Chapter 5 of this report. In spite of the vertical clearance and weight limitations, the Corridor is an active and vital line serving industries in Morris and Warren counties, as well as a major rail customer in Passaic County located on the Totowa Branch which is accessed from the Corridor via the NJ TRANSIT Montclair-Boonton Line. The character and activity varies along the Corridor from single track freight only to double-track electrified passenger service with freight service interspersed.

1. NJ TRANSIT Passenger Service

The Morristown Line consists of a two-track mainline from Morristown to Morris Junction in Roxbury Township, reducing to a single track at Lake Hopatcong Station. The line continues west as a single track from Lake Hopatcong to Hackettstown. East of Netcong, the Morristown Line is owned by NJ TRANSIT. The approximately 10 mile long section of the Morristown line between Netcong and Hackettstown is owned by Norfolk Southern and leased to NJ TRANSIT, which maintains operational control. West of Hackettstown, the Washington Secondary is owned and maintained by Norfolk Southern and operates as a freight only line west to the junction with the Lehigh Line in Phillipsburg.

NJ TRANSIT operates passenger rail service between Hackettstown and Hoboken, with a number of the trains continuing on into Manhattan via the Midtown Direct service on the Northeast Corridor Line. The station in Dover represents a key point along the line with different levels of service operated east and west of Dover. Limited diesel passenger service is provided West of Dover to Hackettstown. East of Dover the system is electrified with regular passenger service provided to Morristown and beyond to Hoboken, NJ and New York City.

The Montclair-Boonton Line joins the Morristown Line at the Denville Station in Denville. This line serves as an alternate route to Hoboken and was established in its current configuration in 2002 when NJ TRANSIT opened a new connection in Montclair between the former Montclair Branch and the Boonton Line. While not the subject of this study it is important to recognize the Montclair-Boonton Line which is accessed from the west via the Morristown Line, and utilized for service to two (2) existing freight rail customers.

On a typical weekday, NJ TRANSIT operates approximately 25 daily trains west of Dover. Approximately 90 passenger trains are run between Dover and Denville, with these trains

divided between the Morristown Line and the Montclair-Boonton Line east of Denville. Passenger service is generally limited to hourly service during the midday non-commuter peak periods. It is during these periods of lower passenger service frequency that Norfolk Southern and Morristown & Erie operate freight service on the line between NJ TRANSIT passenger trains.

2. Norfolk Southern Freight Service

Local freight service on the Washington Secondary and Morristown Line is operated by Norfolk Southern (NS). Inbound freight trains are moved from Allentown Pennsylvania on the Lehigh Line, across the former CNJ Bridge over the Delaware River, running along the Washington Secondary to Washington Yard. NS's H-65 train operates this service on Tuesdays and Thursdays, with NS's H-74 train operating the service on Saturdays. These trains serve two existing customers along the Washington Secondary west of Washington, and interchange cars with NS's H-02 train (the Dover Local) which operates along the Washington Secondary and Morristown Line east of Washington on Monday, Wednesday and Friday. The Dover Local serves a number of customers along this route, as well as interchanging cars with the Morristown & Erie Railway (M&E) at Lake Junction in Roxbury Township. The M&E trains generally operate on Monday, Tuesday and Friday, serving a number of customers along the four (4) branch lines that are accessed via the Morristown Line. The varied operating entities and current service days along the different sections of the Corridor are depicted on Figure II.2.

NS currently utilizes the Washington Secondary to serve a total of nine (9) active NS-served customers. Eight (8) of these customers are located within Warren and Morris Counties, with the ninth customer, Royal Distributors, located in Passaic County. As summarized in Table II.1, NS transports approximately 2,265 loaded railcars annually along the Corridor.

Figure II.2 – Norfolk Southern and Morristown & Erie Railway Service Areas

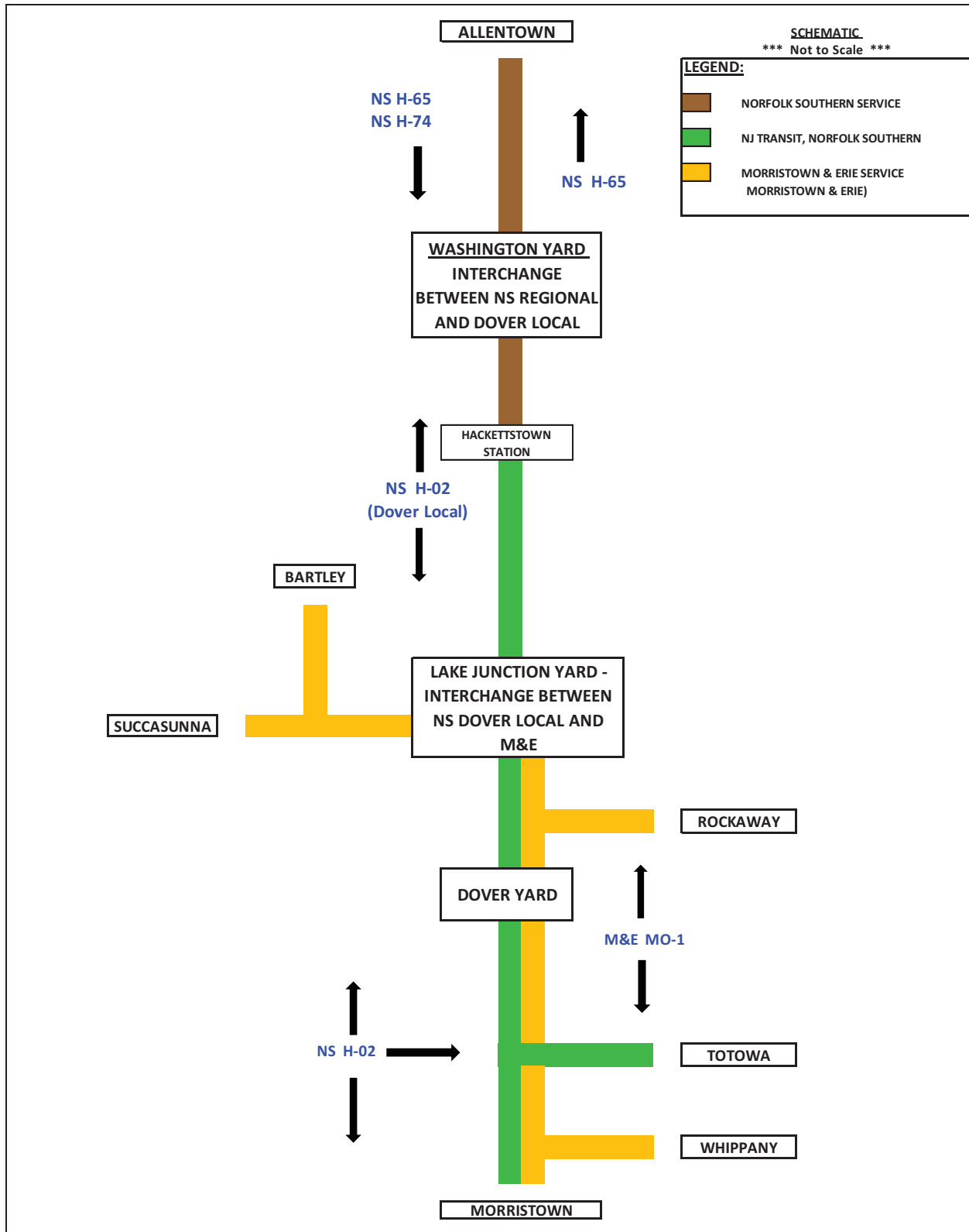


Table II.1 - Existing Customers and Revenue Service along the Corridor

SERVICE AREA	CUSTOMERS	ANNUAL VOLUME-REVENUE CARS (1)
Washington Secondary - Phillipsburg to Washington	2	665
Washington Secondary - Washington to Hackettstown	2	730
Morristown Line - Hackettstown to Morristown	3	70
NS Handoff to M&E at Lake Junction	12 (2)	400 (3)
Montclair / Boonton Line	2	400
TOTAL CORRIDOR FREIGHT ACTIVITY	21	2,265

(1) Does not include return of empty railcars

(2) M&E provides switching service to 12 customers along 4 branch lines

(3) 35 percent of these railcars operate over the Morristown Line to access the Whippany Line

3. Morristown & Erie

As listed in Table II.1, the Morristown & Erie Railway provides local switching service that delivers approximately 400 railcars annually from NS for distribution to a total of twelve (12) active customers along four (4) branch lines accessed via the Corridor. Table II.2 summarizes the distribution of the M&E served customers across the branch lines.

Table II.2 - Existing Service/Activity by M&E

BRANCH LINE	ACTIVE CUSTOMERS	ANNUAL VOLUME-REVENUE CARS (1)
Dover & Rockaway	4	140
Chester Branch	2	100
High Bridge Branch	1	20
Whippany Line	5	140
TOTAL	12	400

(1) Does not include return of empty railcars

4. Current Operating Times

As described above, local freight service to customers along the Corridor and connecting branch lines is operated by NS with some customers being served directly by NS and others being served by M&E after interchanging cars with NS at Lake Junction Yard. As a result of tri-weekly service frequency and multiple connections among local crews, this service design produces inconsistent transit time between Allentown, PA and Morristown, NJ - a distance via rail of approximately 67 miles. Table II.3 summarizes the variability on transit time based on the day of the week a railcar departs Allentown, PA.

Table II.3 - Existing Transit Times

Depart	Day/Time	Arrive	Day/Time	Elapsed Time (Hours)
Allentown	TU/0800	Morristown	FR/1700	81.0
Allentown	TH/0800	Morristown	MO/1700	105.0
Allentown	SU/0930	Morristown	TU/1700	55.5
Morristown	MO/0815	Allentown	WE/2000	59.8
Morristown	TU/0815	Allentown	WE/2000	35.8
Morristown	FR/0815	Allentown	MO/2000	83.8

Total transit times can be even longer for traffic available to move on days that trains are not scheduled to operate. Additional delays can occur as a result of sidetrack orientation, based on the direction the delivery is traveling and whether customer sidetracks face Allentown or Dover (see Figure II.1 - General Track Arrangement). These details have a bearing on rail equipment utilization, operating costs, and security, especially for high-value shipments.

Compounding the effect of infrastructure configuration and the level of demand on the frequency of service offered by the railroads, passenger service operations east of Hackettstown effect the level and frequency of service that can be operated by the freight railroads. Passenger service operated by NJ TRANSIT in Morris County affects freight service along the entire Corridor. Limited operating windows available to the movement of the Dover Local have an effect on the frequency and timing of service to customers along the Washington Secondary as well.

As with most service industries, the frequency of service is generally proportional to the level of demand for the service. The existing service schedule is driven by a relatively low overall demand that can be accommodated by the railroads without daily operation. As a service industry, if improvements are made to the Corridor to eliminate the existing constraints to the

extent that significant growth in rail served industrial development and demand for rail service occurs, the railroads have the ability to adjust and expand their operating practices such that transit times could be reduced, even factoring passenger service, further supporting the attraction of rail served industrial development to Morris and Warren counties.

C. Constraints to Service on the Corridor

Due to the vertical constraints and the weight restricted bridges along the Corridor, a vast majority of these revenue cars are short loaded to maintain weight below 263K, or utilize specially designed railcars. Based on discussions with the railroads and the customers they serve, it is estimated that up to 90 percent of the revenue moves on the Corridor are adversely affected by the vertical constraints and weight limitations.

Short loading a railcar represents an inefficiency that increases the total cost to a business or industry for material transport. Having the ability to increase the volume of heavier commodities in a single railcar delivery by an additional 23,000 pounds would represent an economic advantage to the customers, thereby allowing them to increase their competitiveness in their industry. This constraint particularly affects the businesses that bring in plastic pellets, building materials such as gypsum drywall, liquids and agricultural products such as rice and flour.

Vertical constraints require some customers to use special equipment such as lumber cars with a lower center beam. The ready availability of the specially designed shorter railcars can be problematic for some customers increasing the logistical issues and cost associated with utilizing the rail service.

Investigation of the infrastructure along the Corridor identified a total of eight (8) constraints to the movement of 286K Plate "F" railcars. Vertical constraints that limit the height of a railcar that can be moved along the Corridor were identified in two (2) locations:

- **The South Main Street Bridge (MP 80.23)** in Phillipsburg is located in non-electrified territory and has a total vertical clearance of 16'-6" inches, substantially less than the minimum vertical clearance of 17'-6" inches from the top of rail to the lowest physical structure required for a Plate "F" railcar.
- **The East Hanover Avenue Bridge (MP 31.48)** in Morris Plains is located in electrified territory. Catenary lines suspended below the bridge present a vertical constraint. The configuration of the catenary infrastructure limits vertical clearance to approximately

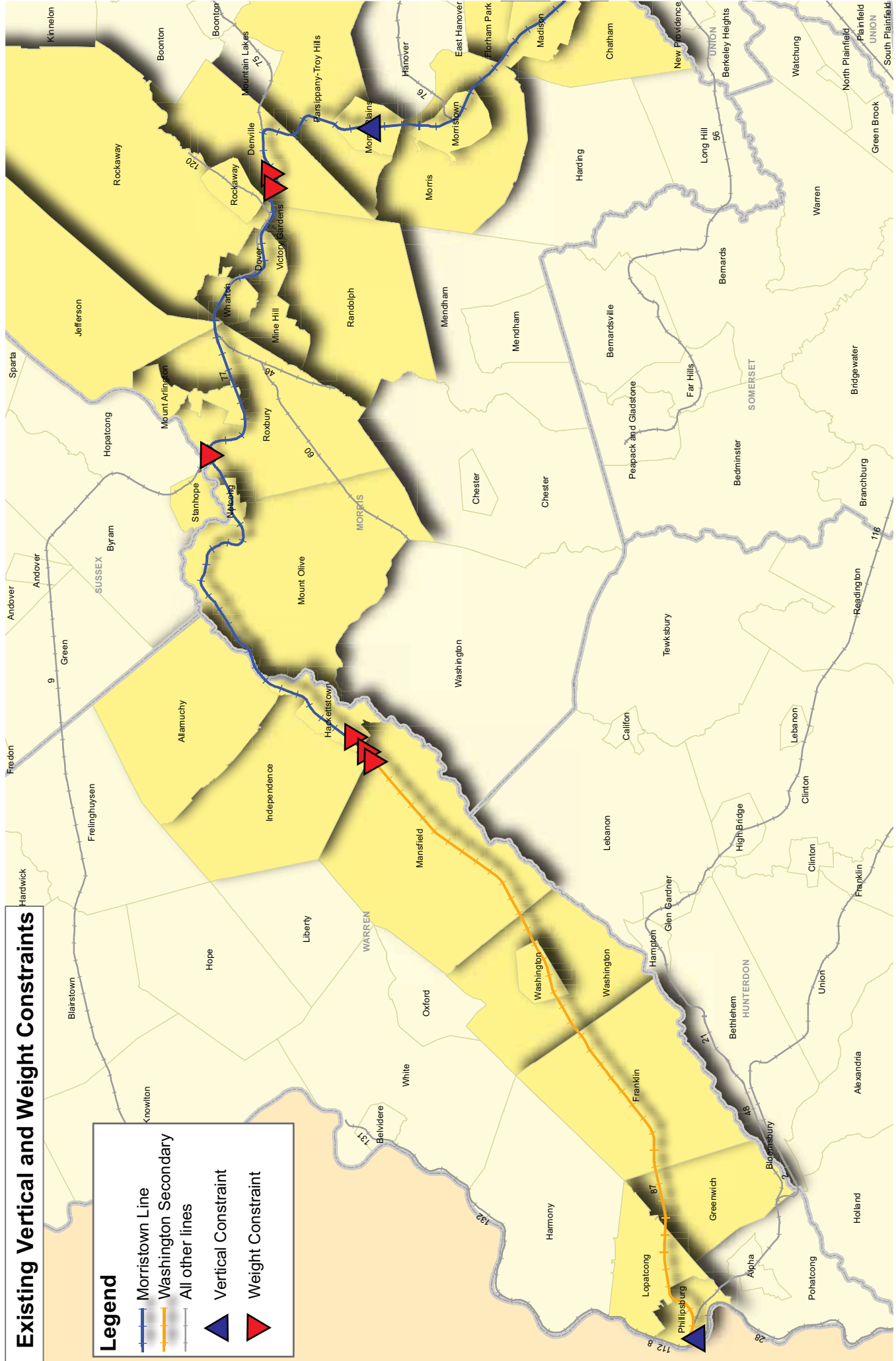
17'-2" in the vicinity of the East Hanover Avenue Bridge. While a minimum structural clearance of 17'-6" is required, electrical transmission lines, particularly high voltage catenary lines, require a larger clearance envelope to avoid the arcing of electrical current when a railcar passes beneath the wire. While larger separation is desirable, a minimum clearance of 17'-8" between the top of rail and the lowest point (sag) of the wire is required for the movement of a Plate "F" railcar.

Weight limitations were identified at six (6) locations along the Corridor:

- **Bridge over Grand Avenue (MP 58.00)** in Hackettstown
- **Bridge over a Cattle Pass (MP 57.49)** in Hackettstown
- **Bridge over a Drainage/Utility Culvert (MP 57.25)** in Hackettstown
- **Bridge over Shippenport Road (MP 44.97)** in Roxbury Township
- **Bridge over the Mill Brook (MP 36.41)** in Denville
- **Bridge over Franklin Road (MP 35.28)** in Denville

While capable of accommodating a 263K railcar, these bridges have been determined by NJ TRANSIT to be structurally incapable of safely accommodating a 286K railcar. These eight (8) constraint locations are shown in Figure II.3.

Figure II.3— Existing Constraints to 286K, Plate “F” Rail Service



In addition to a detailed investigation into the current level of activity and the physical constraints and conditions along the Corridor, the study sought to develop an understanding of just what effect these constraints have on the existing customers. Interviews with current and former rail-served businesses along the Corridor highlighted a number of common concerns as well as specific special actions taken by customers to allow continued use of rail, adapting their operation as best they can to work with the limits of infrastructure only capable of accommodating 263K Plate “C” freight rail.

- Vertical constraints require some customers to utilize special equipment to allow continued use of freight rail. Special lumber cars with a lower center beam to allow the car to fit beneath the South Main Street Bridge in Phillipsburg are utilized by businesses that handle building materials.
- Railcars of gypsum drywall are typically short loaded to maintain a maximum weight of 263K, even though space remains available for additional product to be loaded.
- Railcars of lumber and building materials are frequently short loaded to a maximum weight of 263K, even though space remains available for additional product to be loaded.
- Several existing rail customers import plastic pellets as a component of their manufacturing operations. Approximately 40 percent of the railcars delivered by M&E are plastic pellet hopper cars that are short loaded due to weight limitations along the Corridor.

While the existing customers are taking special steps to enable them to continue receiving deliveries by rail, this ability may cease to exist in the near future. Currently, these businesses must utilize Plate “C” railcars that can fit beneath the vertical constraints on the Corridor. Unfortunately, the rail industry is no longer manufacturing Plate “C” railcars. As cars in the current fleet become worn out and no longer repairable or serviceable, the availability of Plate “C” railcars will continue to diminish. Without Plate “C” railcars, absent a solution to the existing vertical constraints on the Corridor, the existing rail served businesses will have no alternative but to cease utilizing rail. Some of the businesses interviewed indicated that without at least some form of rail service, they would no longer be able to remain in business in their current location, potentially leaving the area or even the state, taking jobs with them.

Investing in the needed infrastructure improvements to allow the passage of a 286K Plate “F” railcar would yield a number of benefits. Existing rail served customers would be able to receive fully loaded railcars and utilize standard equipment. This represents an increased efficiency and reduction in costs related to the importing of their raw materials. This would support not only the retention of these businesses in their current locations, but would support future expansion and growth in these businesses, generating new jobs and economic value to the region and to the State.

The availability of national standard 286K rail service is a highly valued feature when industries are seeking locations to develop a new business. Discussions with industrial real estate brokers working in the area have indicated that 286K rail service is a significant selling point and will increase the ability of Morris and Warren counties to attract new industrial development, generating jobs and economic growth in the region.

The following sections of this report detail the investigation of the identified constraints to 286K Plate “F” rail service, identification of clusters of land deemed viable for new rail served industrial development and projection of the economic value that this new development would bring to Morris and Warren Counties, the NJTPA region and the State of New Jersey.

III. TECHNICAL ADVISORY COMMITTEE AND STAKEHOLDER WORKING GROUP

At the initiation of the study, a Technical Advisory Committee (TAC) was convened to provide technical support and agency / stakeholder perspective to the study process. The TAC members provided a broad range of technical expertise and represented the following organizations:

- NJ TRANSIT
- New Jersey Department of Transportation
- Morris County Department of Planning
- Warren County Department of Planning
- Norfolk Southern Corporation
- Morristown & Erie Railway

The TAC was assembled at key points in the study process to review study findings to date and offer input into the continued study process. At each working session, the project team presented an update of the study progress, and preliminary study products for TAC review and comment. The TAC members served as a valuable resource in assuring that the analysis and the development of study products were based upon the latest available data, and that all considerations that could potentially affect the study process were taken into account. Many of these participating agencies lent office staff support to the study, with many more technical experts providing assistance beyond those who attended the meetings.

Throughout the study, a list of individuals and organizations with a potential interest in the study was assembled. These individuals were invited to participate as part of the Stakeholder Working Group (SWG) through individually coordinated efforts and/or attendance and participation at a Stakeholder Working Group meeting. This list consisted of elected officials from the municipalities through which the Corridor passes, including:

- | | | |
|------------------------|------------------------|-------------------------------------|
| • Town of Phillipsburg | • Allamuchy Township | • Rockaway Borough |
| • Lopatcong Township | • Mount Olive Township | • Rockaway Township |
| • Greenwich Township | • Netcong Borough | • Township of Denville |
| • Franklin Township | • Township of Roxbury | • Township of Parsippany-Troy Hills |
| • Washington Township | • Mount Arlington | • Borough of Morris Plains |
| • Washington Borough | • Jefferson Township | • Township of Morris |
| • Mansfield Township | • Borough of Wharton | • Town of Morristown |
| • Hackettstown | • Town of Dover | |

Representatives of a range of local and state agencies were also contacted individually and invited to participate on the SWG including:

- Warren County Board of Chosen Freeholders
- Morris County Board of Chosen Freeholders
- NJ Highlands Council
- NJ Economic Development Authority
- NJ Business Action center
- ChooseNJ

Existing rail served customers, owners of property that could potentially be developed as rail served industrial sites and industrial real estate brokers were contacted as information sources and invited to participate on the SWG.

IV. DATA COLLECTION

An extensive volume of data was assembled to establish a foundation defining the transportation environment and interrelationship between the Corridor and the industries and potential industries that are served. Additional data was assembled defining the existing land uses abutting and proximate to the Corridor, on-going redevelopment initiatives, zoning regulations and environmental conditions controlling potential future development. The assembled data may be aggregated into the following categories:

- Railroad Infrastructure and Operational Data
- Field Inspections of railroad and roadway infrastructure
- Land Use and Zoning
- Customer Interviews

A. Railroad Infrastructure and Operational Data

1. NJ TRANSIT

In the early project stages, NJ TRANSIT provided considerable data related to the physical configuration of the railroad infrastructure between Morristown Station at milepost 29.80 and CP BILL at milepost 58.00, a point just west of the Hackettstown Station where jurisdictional control of the Corridor switches from NJ TRANSIT to Norfolk Southern. Data sets provided included:

- Track maps of the portions of the Corridor under NJ TRANSIT ownership or jurisdictional control.
- Vertical Clearances
- Bridge plans, inspection reports and ratings
- System Time Tables – Special Instructions governing operation along the Morristown Line

Application of these data was coordinated with representatives of NJ TRANSIT throughout the study process.

2. Norfolk Southern

Norfolk Southern owns the Washington Secondary Line from its junction with the Lehigh Line in Phillipsburg (milepost 80.30) to NJ TRANSIT's Netcong Station (milepost 48.0). While Norfolk

Southern owns the line, as noted above NJ TRANSIT leases the portion of the line from CP BILL (milepost 58.0) to the Netcong Station, and maintains jurisdictional control over operations along this section. Accordingly, NS provided data for the section between CP BILL and the junction with the Lehigh Line including:

- Track maps of the portions of the Corridor under NS ownership and jurisdictional control.
- Vertical Clearances
- Weight restricted bridges

These data were applicable to the evaluation of the rail infrastructure and its ability to accommodate 286K Plate “F” railcars.

In addition to infrastructure data, NS provided a significant amount of data related to their current operations including:

- Annual railcars moved along the Corridor by customer
- Existing businesses that could potentially become rail customers
- Currently unutilized properties that could potentially be redeveloped with rail served uses

These data formed the foundation for identification of potential rail served industrial development and redevelopment sites along the Corridor.

3. Morristown & Erie Railway

The Morristown & Erie Railway interchanges with NS at Lake Junction providing switching service for twelve (12) customers along four branch lines that are accessed via the Morristown Line. The M&E does not control nor maintain the infrastructure along the Corridor, and therefore was not a source for detailed infrastructure data. However, as the switching railroad that services customers in the Morris-Warren region, M&E provided listings of existing industrial businesses that are not currently rail served but were viewed as potential customers, as well as unutilized properties that were felt to have potential for redevelopment with rail served industrial uses. M&E also provided data on the annual number of railcars moved along the branch lines, as well as information related to the percentage of these revenue moves that were short-loaded due to weight restrictions or utilized special railcars due to vertical constraints along the Corridor.

B. Field Inspections of Railroad and Roadway Infrastructure

While the assembled infrastructure data formed a basis for identification of the constraints to 286K Plate “F” railcars, each of the potential constrained locations was inspected in the field to validate the conditions.

1. Washington Secondary

On February 20, 2013, an inspection of the S. Main Street Bridge was conducted. This was not a formal structural inspection but rather a visual inspection made by representatives of the project team and members of the Technical Advisory Committee to identify additional issues that may require consideration or further investigation in the recommendation of a preferred solution to eliminating the constraint, of which there are several. Summarized below, the implications of these issues are discussed in greater detail in Chapter V of this report.

Proximity of Existing Adjacent Uses - Modifications to the bridge could significantly affect the adjacent properties which include the historic former rail station which is currently the home of the New Jersey Transportation Heritage Museum, as well as commercial and residential properties abutting South Main Street.

Property Ownership - There are a variety of public and private sector property owners in the area that could potentially be affected by modification of the South Main Street bridge or reconfiguration of the existing rail alignment and relocation of the existing switch connecting the Washington Secondary to the Lehigh Line to eliminate the need for trains to pass beneath the bridge.

Land Uses Adjacent to the South Main Street Bridge



Source: NJTPA Rail Freight Capacity and Needs Assessment to Year 2040

Property Ownership Adjacent to the South Main Street Bridge



Source: NJTPA Rail Freight Capacity and Needs Assessment to Year 2040

Future Plans by Others - The potential for the reuse or additional uses along the Corridor must be considered in the advancement of any improvement alternative. Most notable is the potential for the extension of NJ TRANSIT's passenger service on the Raritan Valley Line from its current western terminus in High Bridge to Phillipsburg. NJ TRANSIT has studied this passenger service extension, with alternative configurations potentially utilizing portions of the infrastructure proximate to the South Main Street Bridge. The ability to implement passenger service in this area could be hampered to varying degrees, or even precluded by one or more of the options for modifying the location to accommodate 286K Plate "F" railcars. While not actively advancing at this time, this potential passenger service extension needs to be a consideration in any future freight rail improvements.

Historic Resources - A number of historic resources are located within the area that could potentially be affected by modification of the South Main Street Bridge or reconfiguration of the existing rail alignment. These resources include the historic rail station that is physically connected to the bridge through the supporting substructure as well as the remains of the former roundhouse located just east of the bridge along the Washington Secondary.

Other issues including the topography of the area as well as challenges in maintaining effective stormwater drainage will also require further investigation in the advancement of an improvement to accommodate 286K Plate "F" rail service through this area.

2. Morristown Line

On February 4, 2013, under the supervision of an NJ TRANSIT flagger, inspections were conducted at the following locations along the NJ TRANSIT Morristown Line.

- MLK Boulevard – Milepost 30.12 – Morristown
- East Hanover Avenue – Milepost 31.48 – Morris Plains
- Franklin Road – Milepost 35.28 - Denville
- Mill Brook – Milepost 36.41 - Denville
- Howard Boulevard – Milepost 43.16 - Mount Arlington
- Shippenport Road – Milepost 44.97 - Roxbury
- Drain – Milepost 57.25 - Hackettstown
- Cattle Pass – Milepost 57.49 – Hackettstown
- Grand Avenue – Milepost 58.00 - Hackettstown²

² The Grand Avenue Bridge was inspected from the roadway on June 13, 2013

This was not a formal structural inspection but rather a visual inspection made by representatives of the project team and members of the Technical Advisory Committee to verify that the condition of each bridge was consistent with the description as presented in the NJ TRANSIT bridge inspection reports, to identify additional issues that may require consideration or further investigation in the recommendation of a preferred solution to eliminating the constraint.

C. Land Use and Zoning Data

The detailed land use screening process and findings discussed in Chapter VI of this report began with an assembly and review of readily available land use and zoning data. As a starting point in the identification of properties with the potential for development or redevelopment as rail served industrial sites, the study examined land use data for parcels located within a 2000-foot distance from the Corridor (as well as a few select parcels outside this boundary). This evaluation was initiated through assembly of New Jersey Department of Environmental Protection's Land Use Land Cover (NJDEP LULC) data. As identified through mapping of the LULC data and depicted on Figure IV.1, the land use within the study area consists primarily of forest, urban, and agriculture with some wetlands scattered throughout the study area.

Morris and Warren Counties lie within the New Jersey Highlands Region; as such, parcels within the study area are subject to the regulatory provisions of the Highlands Regional Master Plan. The Highlands Regional Master Plan categorizes areas as preservation or planning. Preservation areas have limited opportunities for development. Planning areas allow development, but still have strict development restrictions and requirements. Many of the study area parcels located within Warren County are categorized as forested land cover in the NJDEP LULC. Most of these forested parcels are also in the highlands preservation area. In Morris County the parcels are categorized as a mixture of urban, forested, and wetlands LULC.

Figure IV.1 - Land Use/Land Cover Along the Corridor

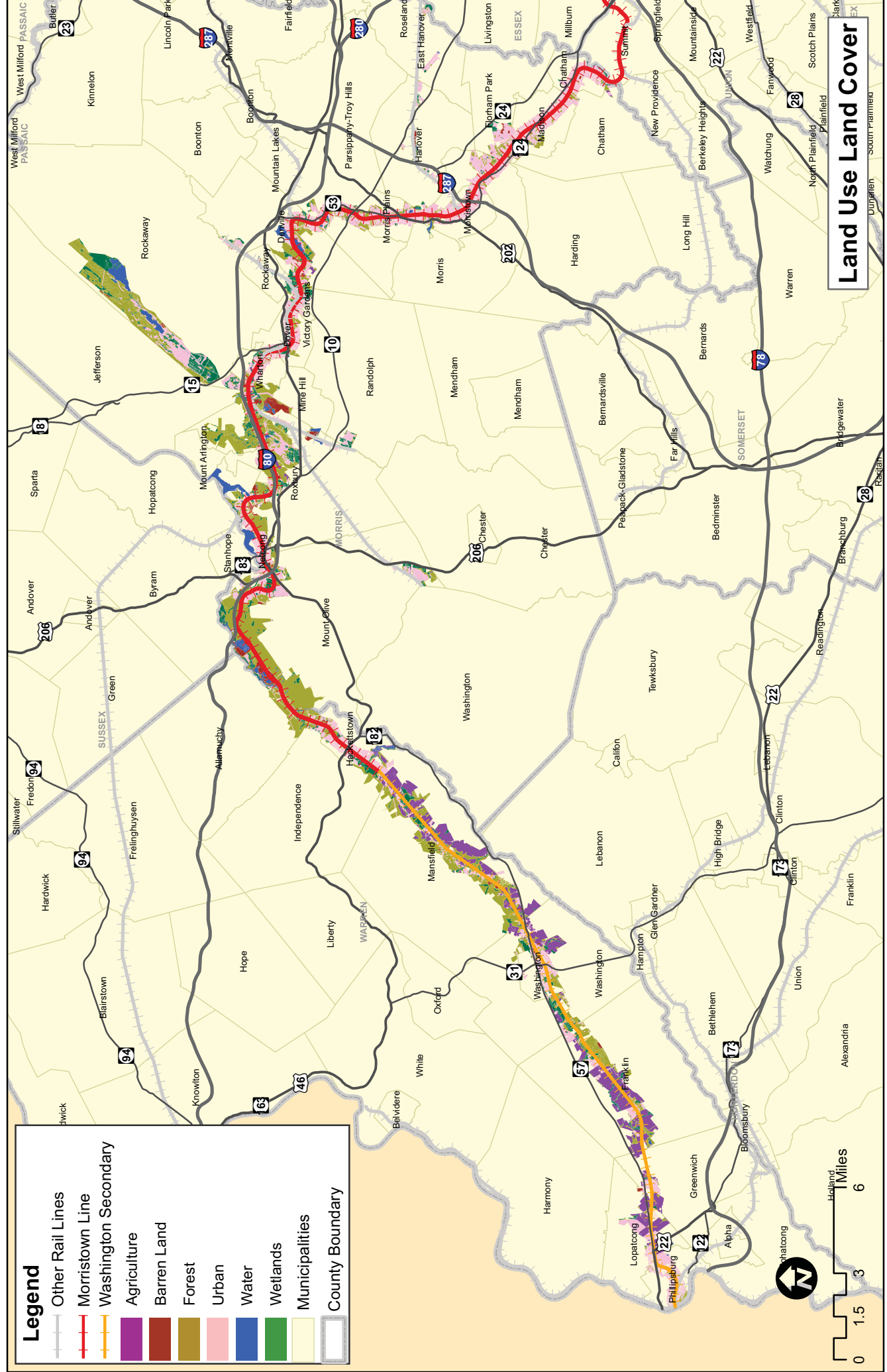


Figure IV.2 - Land Use/Land Cover Along the Corridor in Warren County

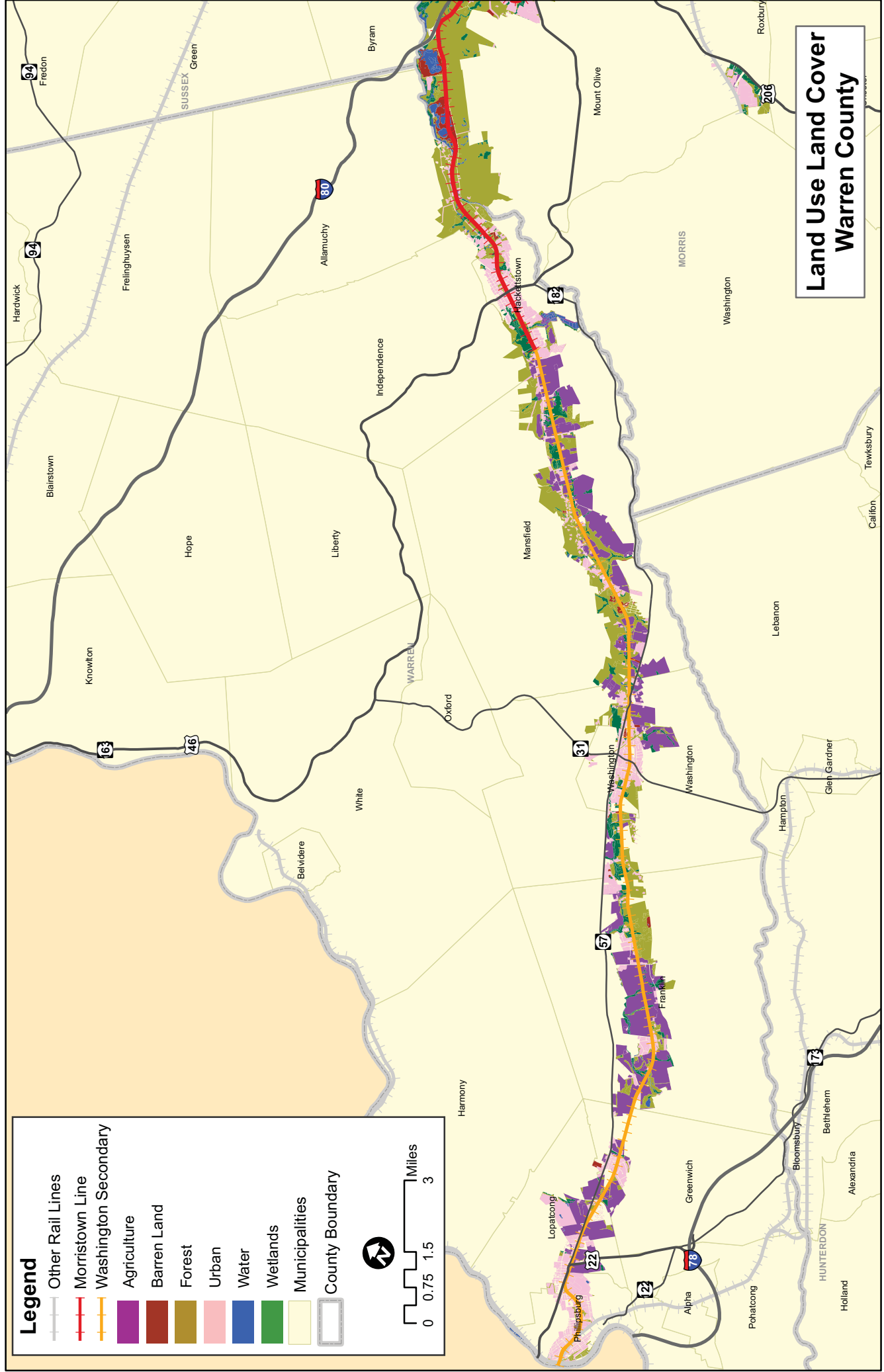
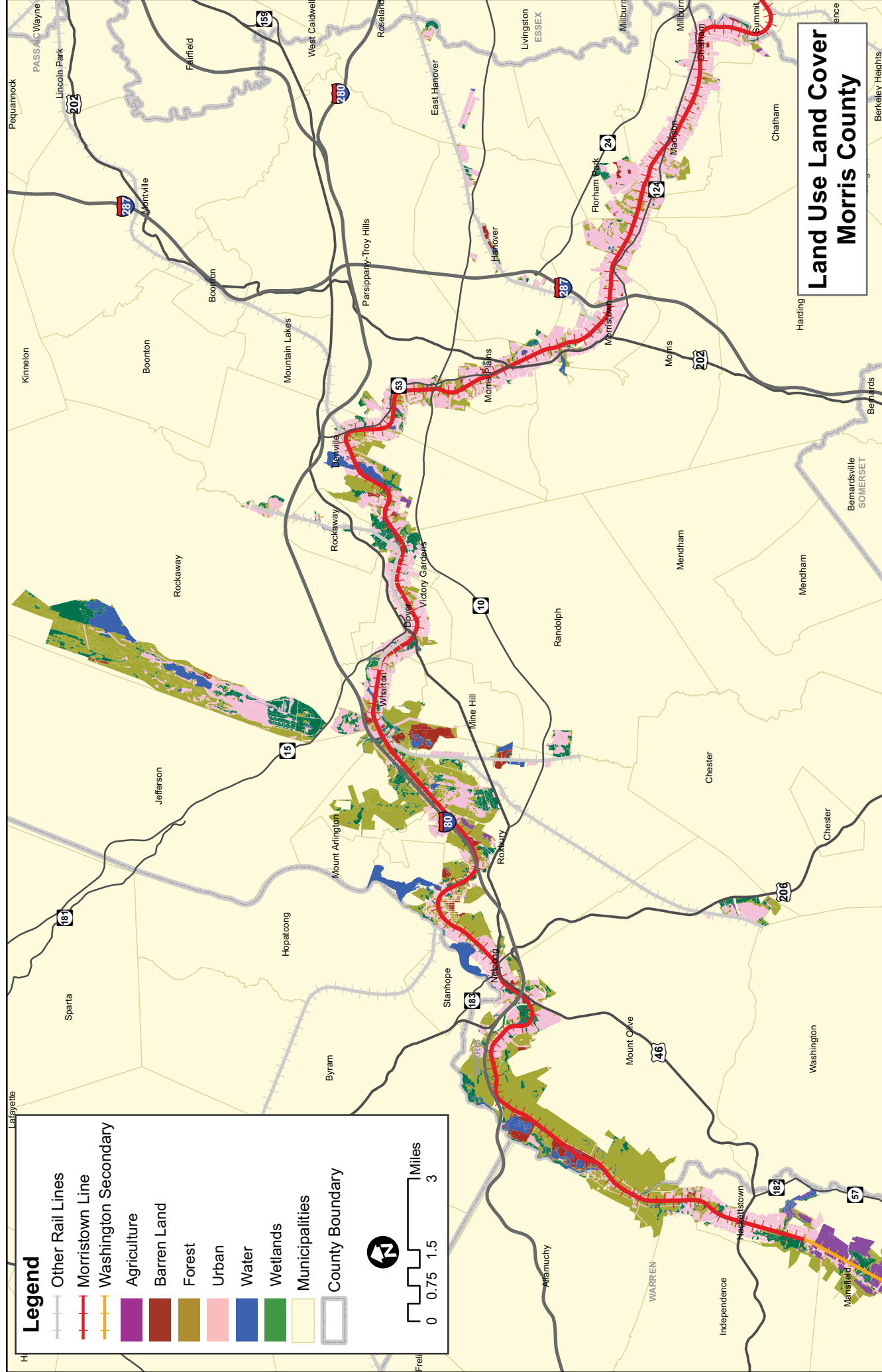


Figure IV.3 - Land Use/land Cover Along the Corridor in Morris County



The NJDEP LULC data was supplemented with a variety of more detailed data provided by the Warren County and Morris County Planning Departments, including:

- Highlands Data – Boundaries (preservation and Planning Areas), Center designations, conservation priority areas, agricultural priority areas,
- Morris County Freight Rail Infrastructure and Land Use Study
- Countywide parcel data
- Land Use/Land Cover data
- Municipal zoning ordinance data
- Mapping of the largest manufacturing employment centers in Warren County

D. Rail-Served Customer Interviews

As a means to gage the potential growth in the use of rail for the shipment of raw materials and finished products, several previous, existing and potential users of rail freight services were interviewed as part of this study. These industry interviews built upon the interview process and findings of the Morris County Freight Infrastructure & Land Use Study. The nine (9) companies interviewed were selected in consultation with the NJTPA and the project's Technical Advisory Committee.

1. Interview Approach and Discussion Topics

The objective of the interview process was to obtain information that could help provide an overall picture of current rail freight movements, considerations and conditions in and affecting Morris and Warren Counties, and the underlying rationale in their decision to use rail (or not to use rail). To that end, a discussion guide was developed to frame the dialogue with the businesses. Discussion guides differ from survey instruments as the objective is to have a generally qualitative dialogue rather than collect specific data. The discussion guide topics included a mix of specific and open ended questions including:

1. Please describe your operations at this location.
2. What freight services do you currently use to receive and ship product from this location (e.g., truck, rail)?
3. Where do your major inbound products come from and where are your major outbound shipments headed (e.g., within NJ, within immediate multi-state area, elsewhere in North America, overseas)?

4. What are the four top considerations in your selection of freight transportation services, such as truck, rail, ocean and air services:
 - a. Cost
 - b. Reliability
 - c. Time Involved
 - d. Security of the Shipment/Shrinkage
 - e. The Freight Modes Used
 - f. Use of "Green"/Sustainable Transportation Options
 - g. Tracking
 - h. Other:
5. What performance measures do you apply to yourself and the transportation providers you engage?
6. Under what circumstances would you consider switching from your current receiving and/or shipment mode(s) to rail?
7. Does your organization currently use any form of rail service? If yes, can you please tell us about your experience?
8. What would you need to know about rail service options before your organization would consider using rail at this location?
9. What service criteria would be most important to you in considering using rail freight services here?
10. Are there any factors that would cause your organization to eliminate rail freight service as a shipping option?
11. What questions does the organization most want answered regarding rail freight operations?
12. Are there additional considerations related to rail freight operations and your company's freight needs that we know for this project?

The suggested discussion topics were provided to the businesses in advance of the discussion, along with a one page project summary. All shippers were informed that individual company information would remain confidential. Where possible, discussions were held on-site at the business location. Discussions began with providing each business with background on the public agencies involved in the project, why and how the agencies are involved in freight services and economic development, and the information collected by the team on the physical characteristics of the rail freight lines in the project area.

2. Interview Discussion Findings

The key findings emerging from the discussions included:

- ***Current rail freight infrastructure and service limits transportation options and business growth in the study area.*** While existing rail users have worked around current limitations, these limitations restrict shipper use of rail freight, make them question continuing to receive shipments by rail in the study area, and could affect future location decisions. In two cases, shippers indicated that removal of the constraints to 286K Plate “F” rail service could influence their decisions on whether to expand both rail use and operations at the sites in the two Counties.
- ***Shippers requiring rail freight service have adapted.*** Companies are using lower height cars and loading to lower weights to comply with the current infrastructure restrictions on the line.
- ***Rail freight rates and service are as important as the rail freight infrastructure.*** Shippers noted that rail rates and service were critical considerations. Service issues included long and variable transit times from suppliers to customers.
- ***A wide range of goods are being shipped by rail from a range of locations.*** Shippers are bringing in a wide range of carload products including bulk shipments of food products, plastic pellets and petrochemicals, along with carload movements of lumber and paper products. Inbound products come primarily from the South, West and Canada.

Lower Height Center-Beam
Lumber Car



V. VERTICAL AND HORIZONTAL CONSTRAINTS AND WEIGHT LIMITATIONS

As discussed previously, two of the primary questions to be answered by this study are:

- *Can a Plate “F” railcar be physically moved along the Corridor?*
- *If not, what and where are the height and width restrictions?*

Figure V.1 presents the cross-sectional physical dimensions of the standard Plate “F” railcar³. As shown, a standard Plate “F” railcar measures 10’-8” in width and 17’-0” in height. While a Plate “F” railcar measures 10’-8” in width, and 17’-0” in height, additional vertical and horizontal clearance is required to account for such variables as vehicle rocking and sway while in motion, loads protruding above the top on an open car, the chord scribed by a railcar traveling on a horizontal or a vertical sag curve and OSHA requirements for minimum separation between the top of car and catenary lines.

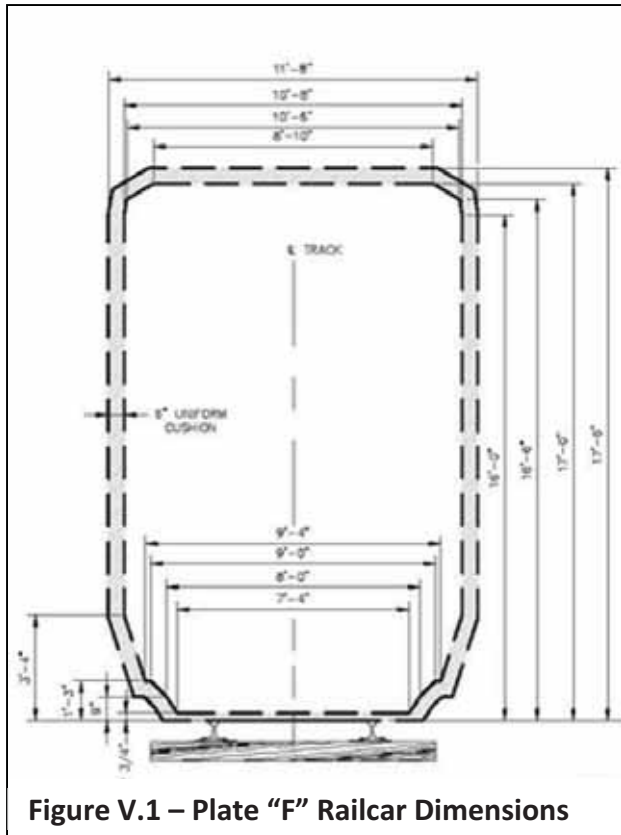


Figure V.1 – Plate “F” Railcar Dimensions

A. Horizontal Constraints

Plate “C” and “E” railcars are routinely run along this Corridor. These railcars have the same width as a Plate “F” railcar (10’-8”).

Accordingly, there exist no horizontal constraints to the movement of Plate “F” railcars along the Corridor.

B. Vertical Constraints

Due to the varying characteristics of the Corridor, two separate minimum vertical clearance requirements exist for the movement of Plate “F” railcars. West of Dover, where no catenary system exists, a minimum clearance of 17’-6” is required. However, east of Dover is electrified territory. With the understanding that catenary lines are run beneath overhead bridges, the

³ Source: Association of American Railroads (AAR)

height of the catenary represents the primary constraint. NJ TRANSIT standards require a minimum of 8 inches of clearance between the top of a railcar and the catenary contact wire to avoid the arcing of electrical current when a railcar passes beneath the wire. Accordingly, in electrified territory, a minimum clearance of 17'-8" is required for movement of a Plate "F" railcar.

1. Washington Secondary – Phillipsburg to Hackettstown

NS was contacted to obtain clearance records for the Washington Secondary from Phillipsburg to Hackettstown. Table V.1 summarizes the existing clearances at locations along the rail line with vertical clearances of less than 23 feet.

Table V.1 - Vertical Clearances along the Washington Secondary – Phillipsburg to Hackettstown

Mile Post	Location Name	Clearance *
58.20	Allen Road	19'-4"
58.34	Dirt Road	17'-9"
58.61	Dirt Road	21'-3"
62.39	Dirt Road	20'-7"
63.21	Main Street	20'-2"
63.71	Brick Yard Road	21'-0"
64.61	Farm Crossing	21'-6"
65.77	SR 57	19'-7"
65.78	SR 57	18'-0"
69.19	Overhead Wire	17'-3"
69.17	Buttermilk Bridge Road	17'-6"
75.71	North Main Street	18'-9"
78.05	SR 22	22'-1"
78.06	SR 22	21'-3"
80.23	South Main Street	16'-6"

* Distance from top of rail to bottom of structure

As shown, only two locations were reported as having a vertical clearance of less than 17'-6".

a. Electrical Lines at Buttermilk Bridge Road (MP 69.19)

The first location is an overhead electrical line at milepost 69.19 adjacent to Buttermilk Bridge Road. Field investigation of this location revealed that the overhead electrical lines had recently



been relocated to taller utility poles that repositioned the wire to a height well above the Buttermilk Bridge Road, which has a vertical clearance of 17'-6". This observation was reported back to NS who subsequently verified the finding and confirmed that no vertical clearance constraint to the movement of a Plate "F" railcar exists at this location.

b. South Main Street Bridge (MP 80.23)

The second location identified by NS as a vertical constraint is the South Main Street Bridge at milepost 80.23 in Phillipsburg. This bridge limits the vertical clearance to 16'-6" and was highlighted in the 2011 Morris County Infrastructure & Land Use Study as a vertical constraint that



effectively controls the height of railcars that can access the Washington Secondary. Elimination of this constraint would clear access for Plate "F" railcars along the Washington Secondary and the Morristown Line up to Morris Plains, and provide unconstrained Plate "F" access to the High Bridge Branch, Chester Branch, Dover & Rockaway Branch and the Montclair-Boonton Line (and by extension to the Totowa Branch). Another NJTPA study, *Rail Freight Capacity and Needs Assessment to Year 2040*, identified four (4) possible improvement concepts to provide Plate "F" clearance at this location (Figure V.2).

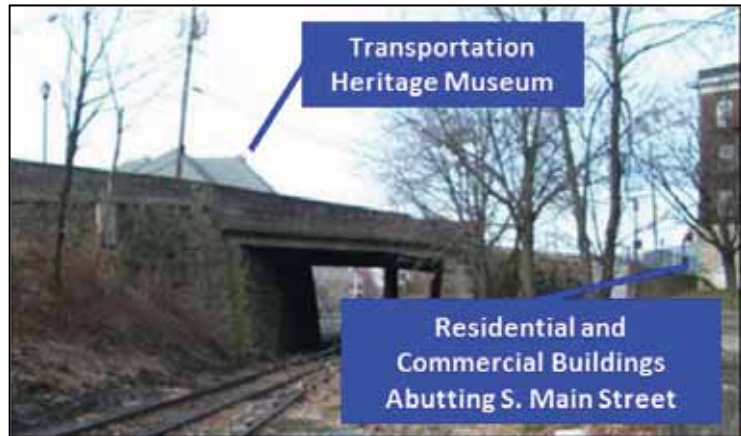
Figure V.2 - Alternative Improvement Concepts to Achieve Plate "F" Clearance at the South Main Street Bridge



Source: NJTPA Rail Freight Capacity and Needs Assessment to Year 2040

Concept 1 – Elevation of the South Main Street Bridge

Replacing the existing bridge with a higher bridge poses a number of challenges. The South Main Street Bridge is actually a compilation of two closely spaced structures – the bridge over the Washington Secondary and the steel truss bridge over the NS Lehigh Line⁴.



Modification (raising) of one bridge would likely necessitate modification of the other bridge to maintain safe vertical alignment for traffic along South Main Street.

South Main Street is closely abutted by active commercial and residential buildings as well as the historic former rail station which is the home of the New Jersey Transportation Heritage Museum. The sidewalk/plaza serving the historic station is structurally integrated with the South Main Street Bridge structure. Modification of the bridge structure would require modification of the historic rail station structure as well.

Concept 2 - Undercutting (Lowering) the Track beneath the South Main Street Bridge

Undercutting of the track to lower the top of rail by approximately 12 inches would eliminate the need to elevate the bridge and potentially affect the historic properties abutting the bridge itself. A preliminary investigation of this option found that undercutting would allow the Washington Secondary to remain on its current alignment and would not affect the location of the existing switch controlling the junction of the Washington Secondary and the Lehigh Line.

While replacement of the bridge superstructure would be avoided with this approach, it is likely that reinforcement or modification of the bridge foundations would be required. Further, this area already experiences pooling water and difficulty with drainage during rain events. Undercutting the track would require drainage improvements for a length of track in the area of the bridge.

Concept 3 – Relocate Connection to the Washington Secondary Track – Low Speed Option

Moving the existing junction with the Lehigh Line to a location east of the bridge would eliminate the need for trains to pass under the South Main Street Bridge. A new low speed

⁴ The NS Lehigh Line utilizes the NJ TRANSIT owned former CNJ line through this section of Phillipsburg..

connection would be constructed just east of the steel truss bridge over the Lehigh Line, with construction being predominantly constrained to municipally owned property. The relocated connection would introduce a more severe curve in the Washington Secondary east of the switch thus lowering the safe operating speed of the line. Further, the vertical grade of the line would increase. The alignment of the relocated track would come into close proximity with the remains of the historic roundhouse located east of the bridge between the Washington Secondary and the Lehigh Line.



On a positive note, the existing switch would be relocated from a curve on the Lehigh Line and placed on a tangent section. The section of the existing track that would be taken out of service could be removed or retained as a feature for use by the Transportation Heritage Museum, potentially for the storage and display of historic railcars.

Concept 4 - Relocate Connection to the Washington Secondary Track – High Speed Option

As with Concept 3, this concept contemplates replacement of the existing switch with a new switch east of the steel truss bridge. This concept would provide the same improvement to vertical clearance as Concept 3 but differs in that the new switch would be constructed as a high speed connection. Construction of this concept would require use of NJ TRANSIT owned property as opposed to primarily municipally owned property, but would likely avoid impacts to the historic roundhouse.

Future Plans by Others – Regardless of which alternative is advanced, consideration must be given to the potential for the extension of NJ TRANSIT’s passenger service on the Raritan Valley Line from its current western terminus in High Bridge to Phillipsburg. NJ TRANSIT’s studies of this passenger service extension include alternative configurations that would potentially utilize portions of the infrastructure and land areas proximate to the South Main Street Bridge. While not actively advancing at this time, this potential passenger service extension needs to be a consideration in the design of any improvements at this location.

Based upon the varied implementation challenges that each of these concepts would likely face, *Concept 2 - Undercutting (Lowering) the Track beneath the South Main Street Bridge* initially appears to be the most feasible and least costly option. Based upon this preliminary evaluation, the construction cost, including the required drainage improvements is estimated to be in the range of \$1.0 to \$3.0 million. Additional engineering investigation would be required to identify details related to the undercutting, bridge foundation enhancement and drainage improvements and development of a more refined construction cost estimate.

2. Morristown Line – NJ TRANSIT

In consultation with NJ TRANSIT, a number of locations were identified for investigation of potential vertical constraints to the movement of Plate “F” railcars. Table V.2 summarizes the existing clearances at locations along the rail line with vertical clearances of less than 23 feet.

Table V.2 - Vertical Clearances along the Morristown Line – Morristown to Hackettstown

Location	MP	Electrified Territory?	Structural Clearance		Catenary Clearance	
			Track 1	Track 2	Track 1	Track 2
E. Hanover Avenue (CR 650)	31.48	Yes	22'4"	21'9"	17'2"	17'3"
NJ Route 10	33.74	Yes	22'3"	22'9"	17'10"	17'9"
Franklin Ave	35.93	Yes	20'3"	20'6"	19'1"	19'6"
Rockaway Road	36.86	Yes	21'9"	21'10"	18'10"	18'10"
Salem Street (CR 665)	37.54	Yes	19'6"	20'0"	18'10"	18'6"
Prospect Street (CR 513)	38.45	Yes	19'0"	19'9"	17'6"	18'0"
Blackwell Street (CR 659)	38.50	Yes	19'10"	19'9"	17'9"	17'11"
US Route 46	38.69	Yes	22'0"	18'10"	19'4"	19'3"
Former CNJ RR	40.16	No	19'3"	19'2"	n/a	n/a
Main Street (CR 634)	40.17	No	21'2"	21'2"	n/a	n/a
Dewey Avenue (CR 642)	40.50	No	18'10"	21'3"	n/a	n/a
I-80 Mt Arlington	44.60	No	23'	22'6"	n/a	n/a
Landing Road (CR 631)	45.53	No	21'1"	n/a	n/a	n/a
NJ Route 183	47.72	No	20'6"	n/a	n/a	n/a
I-80 Netcong	48.45	No	22'4"	n/a	n/a	n/a
International Drive	48.60	No	22'7"	n/a	n/a	n/a
Overhead Wire	49.82	No	20'4"	n/a	n/a	n/a
Overhead Wire	49.84	No	19'9"	n/a	n/a	n/a
Bilby Road	55.29	No	23'0"	n/a	n/a	n/a

As stated previously the minimum clearance for a Plate “F” railcar in electrified territory is 17’-8” from top of rail to the low point of the wire. In non-electrified territory the minimum clearance is 17’-6” inches. Based on the data provided by NJ TRANSIT, only one location, East Hanover Avenue, was identified as having a physical constraint to the passage of a Plate “F” railcar.

a. East Hanover Avenue Bridge (MP 31.48)

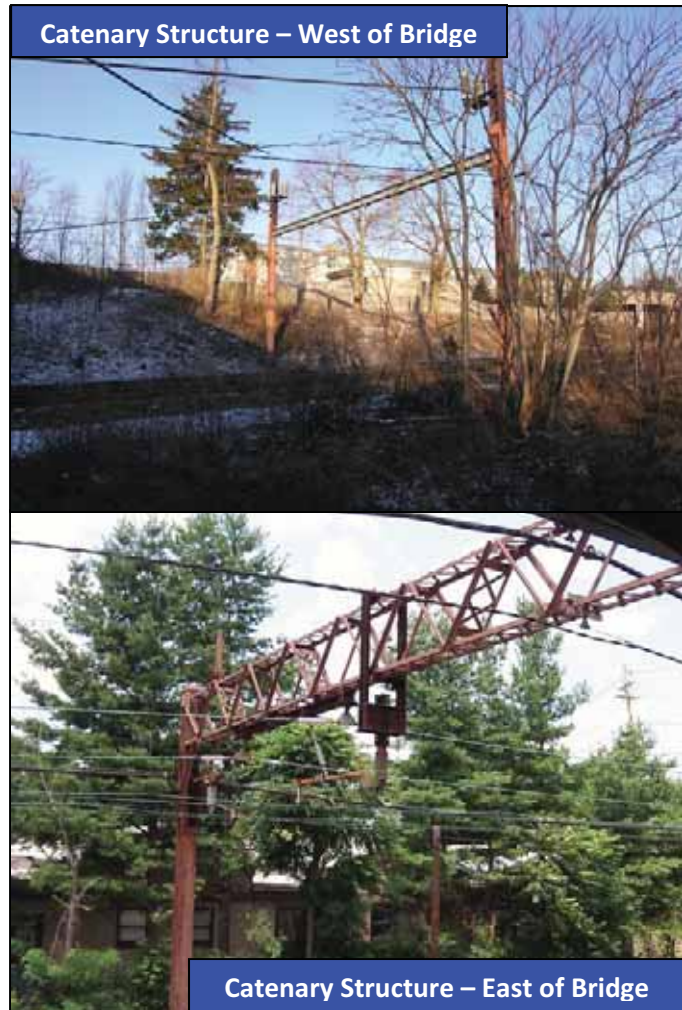
Prior to its acquisition by NJ TRANSIT, the Morristown Line was owned and operated by Conrail, who previously acquired the line from the Erie Lackawanna Railway. As was their standard practice when the overhead catenary system was constructed by the Erie Lackawanna Railway in the early 1930’s, supports for catenary systems were mounted directly to the roadway bridges that crossed over the rail line. In



the early 1990’s, the East Hanover Avenue Bridge was replaced and raised, providing additional clearance for the Morristown Line which passes beneath the bridge. During construction, new catenary portal support structures were installed on the western side of the bridge. The catenary was disconnected from the bridge itself and reconnected to the new supporting structures, but generally remained at its original elevation above the tracks beneath the bridge. While the vertical constraint exists beneath the bridge, it is the height of the catenary wires themselves that represent the vertical constraint to Plate “F” railcars, and not the actual bridge structure.

Through visual reconnaissance of the catenary system and consultation with representatives of NJ TRANSIT, it was determined that there may be adequate space between the wires and the bottom of the bridge itself to raise the wires to provide a minimum of 17’-8” of clearance between the top of rail and the bottom of the catenary contact wire. However, this modification alone would not resolve the vertical clearance constraint in its entirety. Raising the wire beneath the bridge would require regrading of the catenary system to ensure continuous contact with the lower trolley wire.

Based on visual observations and discussions with NJ TRANSIT, it is anticipated that the catenary support structures and mountings on the west side of the bridge could be modified to accommodate regrading of the catenary line to provide the desired Plate “F” clearance beneath the bridge. However, the catenary support structures on the east side of the bridge were not replaced at the time the bridge was reconstructed. These structures were originally installed circa 1930 and cannot be readily modified. They will require replacement to accommodate regrading of the catenary line. At this early planning stage, it is anticipated that a minimum of two, and possibly as many as four of the catenary support structures east of the bridge would require replacement to accommodate a higher catenary elevation.



While this preliminary improvement concept appears to be feasible, additional engineering investigation will be required to determine the limits of the required modifications and the number of catenary portal structures that would need to be replaced on the east side of the bridge. Assuming that three structures east of the bridge would require replacement, and that modification of the existing structures west of the bridge could be accomplished without replacement of the portal structures, the cost for changing the elevation of the catenary in this area to accommodate Plate “F” railcars is estimated to be in the range of \$1.0 to \$1.5 million.

As an alternative to raising the catenary, the tracks in this area would need to be undercut by a minimum of 6 inches to achieve the desired Plate “F” clearance in electrified territory of 17’-8”. A detailed engineering investigation would need to be conducted to determine if undercutting in this area is even feasible. Assuming that undercutting of the tracks would be feasible, it is estimated that the cost of undercutting to provide vertical clearance for Plate “F” railcars would be in the range of \$0.5 to \$1.0 million.

C. Weight Limitations

Elimination of the vertical constraints to the movement of a Plate “F” railcar would significantly improve the utility of this Corridor for existing and potential future freight rail customers. However, several of the key questions this study seeks to answer remain:

- ***Can the Corridor safely accommodate a 286K railcar?***
- ***If not, what structures (bridges) are not rated for 286K traffic?***
- ***What are the options for eliminating the clearance and weight limitations? At what cost?***

1. Washington Secondary – Phillipsburg to Hackettstown

NS was contacted to obtain information related to the weight limitations on the bridges on the Washington Secondary between Phillipsburg and Hackettstown. Representatives of NS indicated that there are no constraints to the movement of 286K railcars along this section of the Corridor.

2. Morristown Line – Hackettstown to Morristown

NJ TRANSIT was consulted to identify locations along the Morristown Line between Hackettstown and Morristown that were deemed not to be structurally sufficient to accommodate industry standard 286K railcar service. NJ TRANSIT provided a listing of thirteen (13) bridges along this section of the Corridor that required additional investigation. This list was initially assembled based upon the Cooper ratings assigned to the bridges. Described in more detail in the following discussion, the Cooper rating, developed by Theodore Cooper in 1894, is a system of calculations and standards for determining the safe loading of railway bridges. A Cooper Rating of E-71.5 or greater is required for a bridge to be considered structurally sufficient to accommodate 286K railcars. Table V.3 lists the bridges identified for further investigation by virtue of their having an assigned Cooper Rating of E-71.5 or less.

Table V.3 - Undergrade Bridges Investigated for 286K Railcar Carrying Capacity

Location	MP	Location	Bridge Type	Cooper Rating
MLK Boulevard	30.12	Morristown	Steel Through Girder	E-67
Waterway	32.57	Morris Plains	Brick Arch	E-68
Estling Lake	34.58	Denville	Concrete Slab	E-66
Franklin Road	35.28	Denville	Concrete Slab	E-23
Mill Brook	36.41	Denville	Concrete Slab	E-40
Rockaway River	39.46	Wharton	Steel Deck Girder	E-69
Rockaway River	41.23	Roxbury	Steel Deck Girder	E-57
Mill Street	41.29	Roxbury	Steel Deck Girder	E-60
Howard Boulevard	43.16	Mount Arlington	Steel Deck Girder	E-67
Shippenport Road	44.97	Roxbury	Steel Through Girder	E-55
Drain	57.25	Hackettstown	Concrete Slab	E-42
Cattle Pass	57.49	Hackettstown	Concrete Slab	E-49
Grand Avenue	58.00	Hackettstown	Concrete Slab	E-49

a. Rail Bridge Rating

NJ TRANSIT provided copies of the Cycle 1, 2 and 4 Bridge Inspection reports for all of the bridges identified for further investigation. These detailed structural inspections provide an accurate picture of the condition of the bridges and what weight of freight cars they could safely carry.

Railroad bridges are generally designed for a Cooper E Load. The Cooper load consists of two engines and a trailing string of freight cars. The number after the “E” is the weight of the heaviest axle in kips. A kip is a unit of weight equal to 1000 lbs. The spacing between each of the axles remains constant. The weights of the other axles are proportionate to the Cooper E load. Railroad bridges built today are usually designed for Cooper Rating of E-80, which has a maximum axle weight of 80 kips.

The axle configuration and weight of axles, for a train of 286K cars, is different than that of a Cooper E series train; therefore there is no single Cooper E Load associated with the 286K cars. The equivalent Cooper load will vary depending on the span length.

Ratings for railroad bridges are calculated using the American Railway Engineering and Maintenance-of-Way Association Manual for Railway Engineering (AREMA Manual). Maximum stresses on the various structural components of the bridge are calculated for a string of cars moving over the bridge. The rating of the bridge is based on what size car the weakest member can handle.

In order to rate a bridge, the stress caused by a 286K car is calculated for each specific load bearing member. The stress for that member is also calculated for a Cooper E1 train. The equivalent Cooper load for a 286K car, for that specific member, is a proportion of the two.

The forces that are applied to a railroad bridge consist of the weight of the bridge itself, the weight of the train as if it were at rest, and an additional force due to impact that is caused by the movement of the train. The impact is a percentage of the weight of the train that depends on the dimensions of the bridge and the speed of the train.

Rail lines are assigned a load rating based on the weight of car that can safely be transported over its bridges. The most common gross weights of freight cars that are used when rating rail lines are 263, 286 and 315 kips. The empty weight of the car itself and an allowable weight of material that can be shipped in the car are noted on the side of the car. The sum of these two weights is usually 263, 286 or 315 kips. The higher the rating on a line the more options shippers have and the lower their cost.

NJ TRANSIT calculated the allowable Cooper E loads for each of the members of the bridges they inspected and rated on the Morristown Line. They used this to generate a list of bridges that may not have a sufficient rating for 286K cars based on the previous ratings. A single axle of a 286K car weighs 71.5 kips. By inspection, NJ TRANSIT concluded that any bridge that had a Cooper E rating of 71.5 or above could handle 286K cars. Any bridge that did not meet this criterion was investigated further. There were 13 bridges that could not be immediately identified as being able to safely carry 286K cars.

The AREMA Manual uses two types of stresses for rating bridges. The first is the normal rating stress. The normal rating stress is the maximum stress recommended to be used for daily traffic. The second is the maximum rating stress. This is a higher stress and may be used for infrequent loads. The AREMA Manual states that “The Engineer may authorize load levels up to the maximum rating at more frequent intervals, recognizing that the remaining useful life of the bridge may be significantly shortened.”

NJ TRANSIT bridge ratings are based upon normal rating stresses assuming a 60 mph running speed. Based on discussions and consultation with representatives from NJ TRANSIT, thirteen

(13) bridges were evaluated with the rating calculations based on maximum train speeds of 40 mph. This lower speed produces lower impact forces, and therefore a slightly higher Cooper rating, for the bridge.

The allowable Cooper E load for the critical structural components of these bridges was provided by NJ TRANSIT in their rating reports. These were compared to the Cooper E loads that would be caused by 286K railcar traveling at 40 mph. Through application of this analysis process, the number of bridges identified as being insufficient to accommodate a 286K railcar was reduced from thirteen (13) to six (6).

These bridges were visited in the field on February 4, 2013 to verify conformance with the existing plans and the findings presented in the bridge inspection reports. Based upon the review of NJ TRANSIT plans and documents and observations made in the field, preliminary recommendations for improvements of the six (6) bridges were developed.

3. Bridge Replacement / Rehabilitation Recommendations

a. Grand Avenue (MP 58.00) – Hackettstown

This bridge is located approximately 1 mile west of the Hackettstown station in the Town of Hackettstown. This bridge is also the location where NS jurisdictional control of the line ends and NJ TRANSIT jurisdiction begins.

This structure consists of a single span concrete span supported on stone abutments. The bridge currently carries a single track but has sufficient width for two tracks. Due the overall deterioration, age and configuration of the structure replacement or strengthening of individual members is not considered practical or feasible. It is recommended that for improvements to this location to accommodate 286K railcars, the entire superstructure and supporting abutments be removed and replaced with a new bridge.



Grand Avenue Bridge

Recommendations / Cost

It is recommended that the entire bridge structure be replaced with a bridge type to be determined as part of a detailed engineering investigation. The likely cost for this improvement is estimated to be between \$2.0 and \$4.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to State Historic Preservation Office (SHPO) and other requirements.

b. Cattle Pass (MP 57.49) - Hackettstown

This bridge, located approximately ¼ mile west of NJ TRANSIT's Hackettstown Station is a single span bridge with a concrete superstructure supported on stone abutments. The bridge currently carries a single track but has sufficient width for two tracks. This bridge originally provided access for livestock between the formerly active agricultural properties on both sides of the track. Visual inspection appears to indicate that there is no longer an agricultural use on either side of the track requiring maintenance of this bridge.

There are two primary options for improvements to this location to accommodate 286K railcars. Option 1 would be to remove the bridge and the underpass, filling this location with suitable materials and eliminating the concrete slab superstructure. However, it is important to note that this bridge is located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Removal of the bridge would require coordination with the SHPO.

As opposed to removal of the bridge, Option 2 would be to replace the existing concrete slab superstructure and abutments, replacing it with a precast concrete box structure. While this would still involve coordination with SHPO, it is likely that this alternative would result in fewer adverse effects on historic resources, would be more achievable and would involve less time and cost.

Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that Option 2 – Replacement of the bridge with a



precast concrete box structure be advanced into engineering, design and implementation. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$1.5 and \$2.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

c. Drain (MP 57.25) – Hackettstown

This bridge, located approximately 500 yards west of NJ TRANSIT's Hackettstown Station, is a single span bridge with a concrete superstructure supported on concrete abutments. The bridge currently carries two tracks. This bridge serves to accommodate a mix of drainage pipes and stormwater runoff conveyed from the south side to the north side of the tracks.



Similar to the Cattle Pass bridge at MP 57.49, this bridge is located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Removal of the bridge would require coordination with the SHPO. The recommended option for improvements to this location to accommodate 286K railcars is removal of the bridge, replacing the existing concrete slab superstructure and abutments with a precast concrete box structure.

Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the replacement of the structure with a precast concrete box structure be advanced into engineering, design and implementation. It is proposed to remove the existing bridge and install a precast concrete box structure. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$1.5 and \$2.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

d. Shippenport Road – Roxbury

This bridge, located in the Township of Roxbury, is a single span, open deck bridge carrying two tracks where the railroad ties are directly supported on steel longitudinal beams (stringers). The stringers are supported on transverse floor beams, which are supported on steel through girders. According to the NJ TRANSIT bridge inspection reports, the stringers, floor beams and girders can safely carry 286K railcars. However, the bolts that connect the stringers to the floor beams are not adequate to handle 286K railcars.

This bridge is also located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Modification of the bridge would require coordination with SHPO. The recommended option for improvements to this location to

accommodate 286K railcars is the removal of the bolts connecting the stringers to the floor beams and the associated connection angles and installation of new connection angles with additional, stronger grade bolts. It will be necessary to field drill holes in the stringers and floor beams for these bolts.

Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the bolts and connection angles be replaced with materials of a sufficient size and material grade to safely accommodate 286K railcars. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$1.0 and \$1.5 million. This cost estimate is a



preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

e. Mill Brook (MP 36.41) – Town of Denville

This bridge, located in the Town of Denville, is a single span, but consists of two (2) different types of bridges. The original bridge on the northern side is a historic stone arch bridge. The original Mill Creek crossing was expanded with the addition of a concrete slab superstructure supported on concrete abutments immediately adjacent to the original bridge. The original two tracks that crossed the stone arch bridge were relocated onto the new concrete slab bridge, with the tracks over the original arch section removed. The two-section bridge has adequate width to accommodate four (4) tracks.

The recommended option for improvements to this location to accommodate 286K railcars is removal and replacement of the existing concrete slab portion of the bridge and strengthening the concrete abutments.

It is anticipated that the entire bridge, both the original arch section and the newer concrete slab section will require replacement.



Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the entire bridge structure, both the concrete slab and the stone arch sections be replaced with structural enhancement of the concrete abutments as necessary to safely accommodate 286K railcars. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$2.5 and \$4.0 million. This cost estimate is a preliminary order-of-magnitude

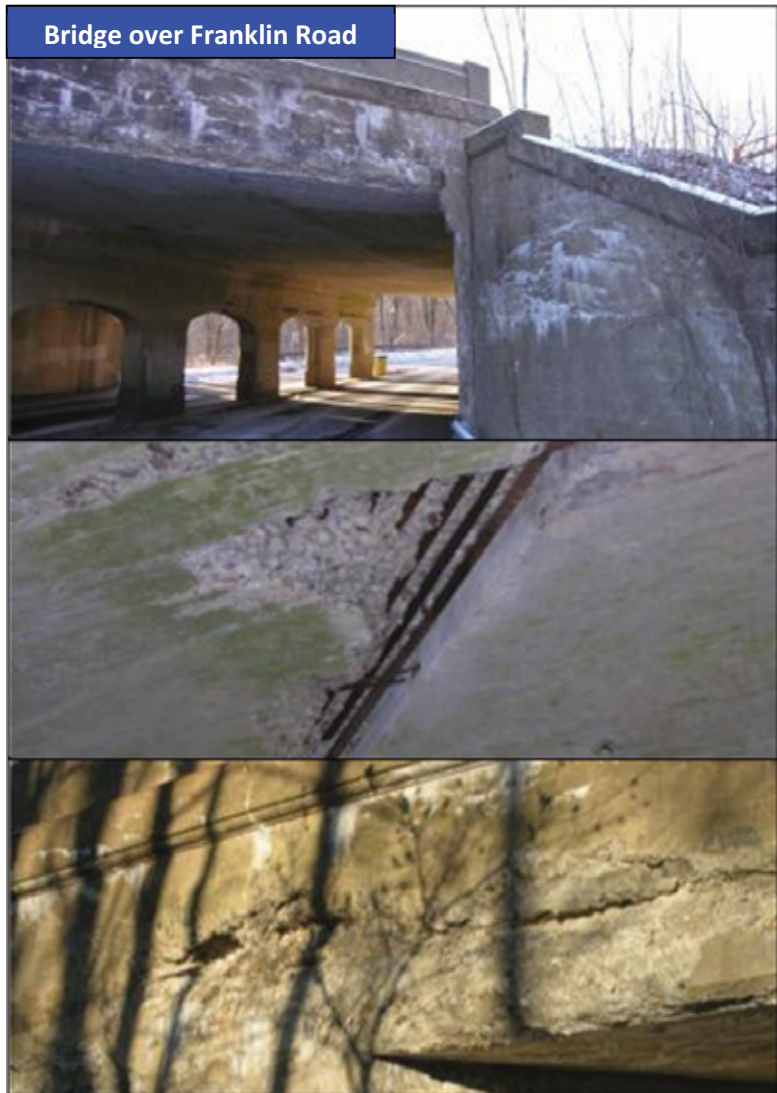
estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

f. Franklin Road (MP 35.28) – Town of Denville

This bridge, located in the Town of Denville, is a two span concrete bridge carrying two tracks. The bridge has adequate width to accommodate three tracks, but currently carries only two. Due to the significant deterioration of the superstructure and concrete abutments noted in the NJ TRANSIT bridge inspection reports and observed during the field inspections, replacement or strengthening of individual members is not considered practical or feasible.

It is recommended that for improvements to this location to accommodate 286K railcars, the entire superstructure and supporting abutments be removed and replaced with a new bridge. This location presents some challenges to the actual construction due to the skewed

angle of the bridge crossing Franklin Road, as well as the width of the existing bridge and the need to maintain passenger rail service during the period of construction.



Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the entire bridge structure be replaced with a

bridge type to be determined as part of a detailed engineering investigation. Due to the construction challenge that replacement of this bridge presents and in consultation with NJ TRANSIT the cost for this improvement is estimated to be between \$8.0 and \$12.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

D. Constraint Mitigation – Capital Requirements and Staging

As detailed above and summarized in Table V.4, the preliminary total program construction cost estimates range from \$18 to \$30 million. It is important to reiterate that these cost estimates are preliminary order-of-magnitude estimates only, and are not based upon detailed engineering investigations. Additional costs may be incurred due to SHPO and other requirements.

Table V.4 - Summary of Capital Construction Cost Estimates

Constraint	Mile Post	Construction Cost (x1,000) *	
S. Main St	80.1	\$1,000	to \$3,000
Grand Ave	58.00	\$2,000	to \$4,000
Cattle Pass	57.49	\$1,500	to \$2,000
Drain	57.25	\$1,500	to \$2,000
Shippenport Rd	44.97	\$1,000	to \$1,500
Mill Brook	36.41	\$2,500	to \$4,000
Franklin Rd	35.28	\$8,000	to \$12,000
E. Hanover Ave	31.48	\$500	to \$1,500
TOTAL		\$18,000	to \$ 30,000

* Cost estimates are preliminary order-of-magnitude only, and are not based upon detailed engineering. Additional costs may be incurred due to NJDEP, SHPO and other requirements.

Benefits to 286K Plate “F” railcar access may be achieved incrementally as each of the recommended improvements offer benefits to service of existing and future businesses located along discrete portions of the Corridor and the branch lines it serves. These key junctions and the cumulative cost for providing 286K Plate “F” railcar service are summarized in Table V.5 and Figure V.3.

Assuming that the improvements to the South Main Street Bridge were to be completed at a cost of between \$1.0 and \$3.0 million, 286K Plate “F” service would be accommodated from Phillipsburg to just west of Hackettstown. This would represent a substantial benefit to the existing and potential future rail served customers along this portion of the Corridor

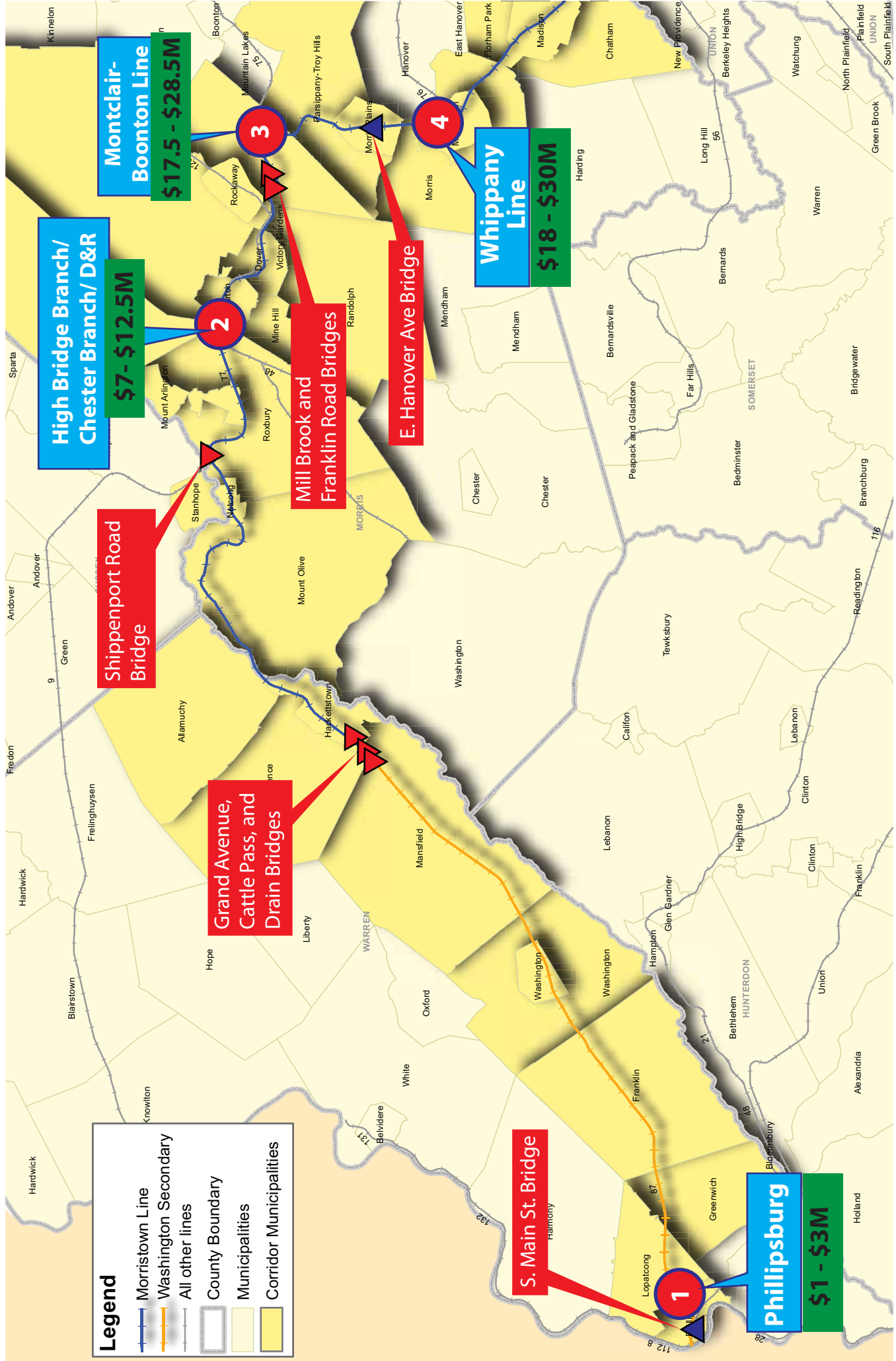
Table V.5 - Cumulative Cost to Achieve Clearance to Key Junctions along the Corridor

Key Junction	Importance	Required Improvements	Cumulative Cost
Delaware River Crossing	Entry to State and the Morris-Warren Rail Corridor	S. Main Street Bridge	\$1,000 to \$3,000
	Support for Rail Served Development in Phillipsburg		
Washington Yard	Support for Rail Served Development in Washington Borough and Mansfield Township	N/A	\$1,000 to \$3,000
Lake Junction Yard	NS interchange with M&E	Grand Avenue Bridge Cattle Pass Bridge Drain Bridge Shippenport Road Bridge	\$7,000 to \$12,500
Chester Junction	Service Customers along Chester/ High Bridge Branches	N/A	\$7,000 to \$12,500
	Support for Rail Served Development in Roxbury Township		
D&R Junction	Service Customers along Dover & Rockaway Branch	N/A	\$7,000 to \$12,500
Montclair Line	Service Customers along Montclair Line and Totowa Branch	Mill Brook Bridge Franklin Road Bridge	\$17,500 to \$28,500
Whippany Line	Service Customers along Whippany Line	E. Hanover Avenue Catenary Heightening	\$18,000 to \$30,000

In addition to the South Main Street Bridge improvements, improvements to the Grand Avenue, Cattle Pass and Drain bridges in Hackettstown and the Shippenport Road Bridge in Roxbury would allow industry standard freight rail access to a number of key locations along the Corridor including Lake Junction Yard where NS interchanges railcars with M&E for switching to local customers. These improvements, at a cumulative cost estimate of between \$7.0 and \$12.5 million would support freight rail service to existing and future customers along the High Bridge Branch, the Chester Branch and the Dover & Rockaway Branch.

Improvements to the Mill Brook Bridge and the Franklin Road Bridge at a cumulative construction cost of between \$17.5 and \$28.5 million would open up 286K Plate "F" service to customers along the Montclair-Boonton Line and subsequently the Totowa Branch. The final recommended improvement, raising of the catenary at the East Hanover Avenue Bridge in Morris Plains would open up industry standard freight rail access to the Whippany Line as well as Colgate, one of the newest rail customers along the Corridor located just east of the East Hanover Avenue bridge.

V.3 - Cumulative Cost Estimates of Improvements Providing 286K Plate "F" Railcar Access to Key Junctions



VI. RAIL SERVED INDUSTRIAL DEVELOPMENT POTENTIAL

Projecting the economic benefit of investing in the infrastructure improvements required to accommodate 286K Plate “F” rail service is built upon projection of just how much new rail served industrial development could be attracted and supported by the improvements. This projection process began with identification of properties offering significant potential for new or expanded rail served industrial development along the Corridor. Identification of potential development properties incorporated a series of steps to screen and rank undeveloped and under developed properties including:

- Review of existing land uses
- Assembly of a Master List of properties for more detailed investigation in coordination with County Planning Departments and the Freight Railroads
- Phase 1 Screening - Highlands and Farmland Preservation Areas
- Phase 2 Screening - Land Use/Land Cover and Protection Areas
- Phase 3 Screening - Known Contaminated Sites, Natural Resources, Cultural Assets and Zoning
- Municipal and property owner outreach

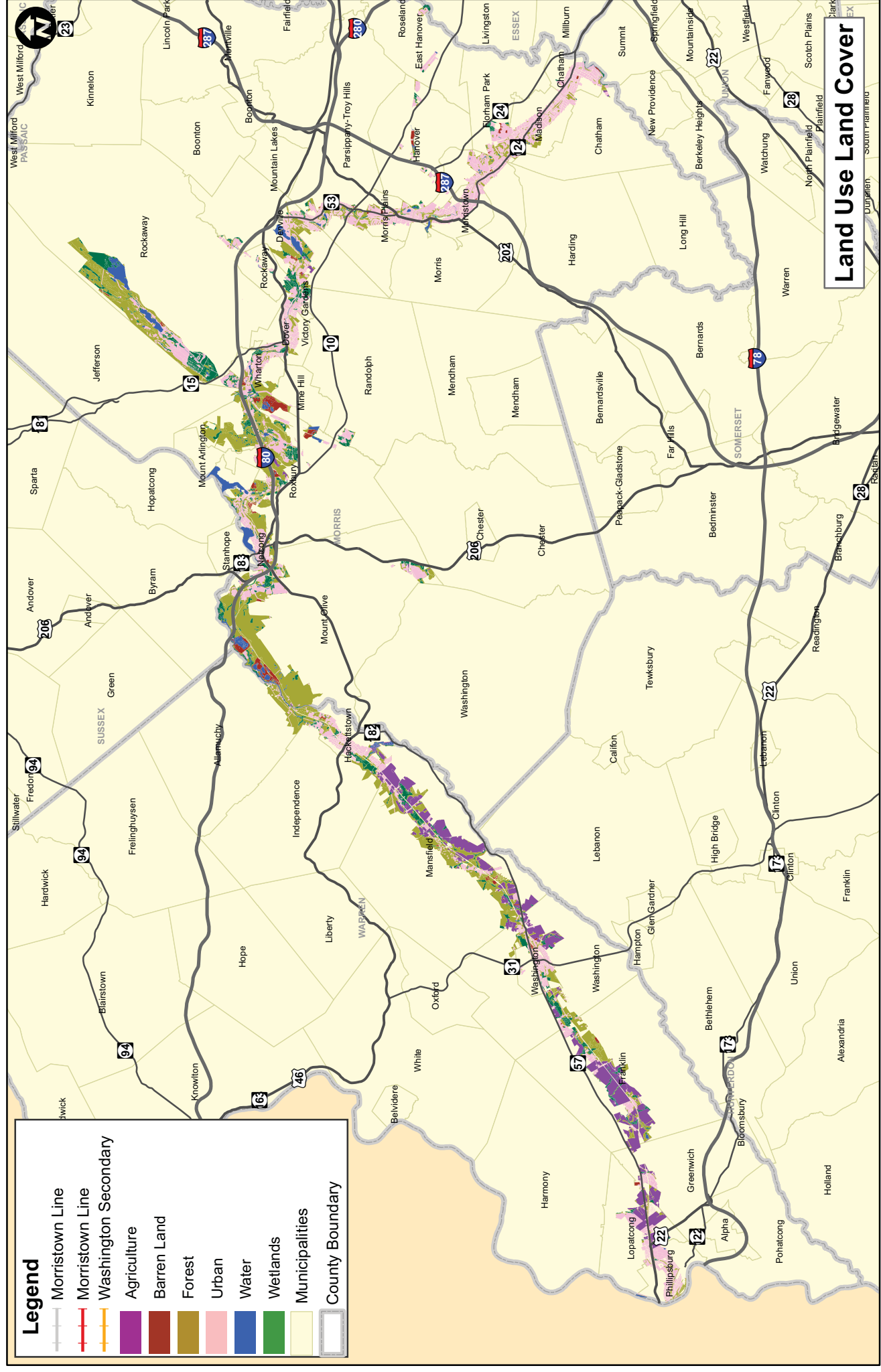
Application of the above process resulted in the identification of properties or clusters of properties that are available for development/redevelopment and are not significantly constrained by environmental conditions. Several of these properties are already the subject of municipal redevelopment planning initiatives.

A. Existing Land Uses

As a starting point in the identification of properties with the potential for development or redevelopment as rail-served industrial sites, the study examined land use data for parcels located within 2000-feet of the Corridor (as well as a few more distant select parcels). According to NJ Department of Environmental Protection’s Land Use Land Cover (NJDEP LULC), the land use within the study area consists primarily of forest, urban, and agriculture with some wetlands scattered throughout the study area. (See Figure VI.1 - Land Use Land Cover).

Much of the study area parcels located within Warren County are categorized as agricultural or forested land cover in the NJDEP LULC, and most of these forested parcels are also in the Highlands preservation area. In Morris County the parcels are categorized as a mixture of urban, forested, and wetlands LULC.

Figure VI.1 - Land Use Along the Corridor



B. Master Property List

The master property list encompasses parcels of land that have the potential to be served by an improved rail corridor. The study partners, including the North Jersey Transportation Planning Authority, railroad operators, county representatives, and the consultant team collaboratively developed a master property list including what each partner viewed as potentially rail-developable properties. This included previously rail-served properties, current rail-served properties, industrial redevelopment areas, vacant lands abutting the Corridor and properties that were already of interest to the freight railroads as potential future customers.

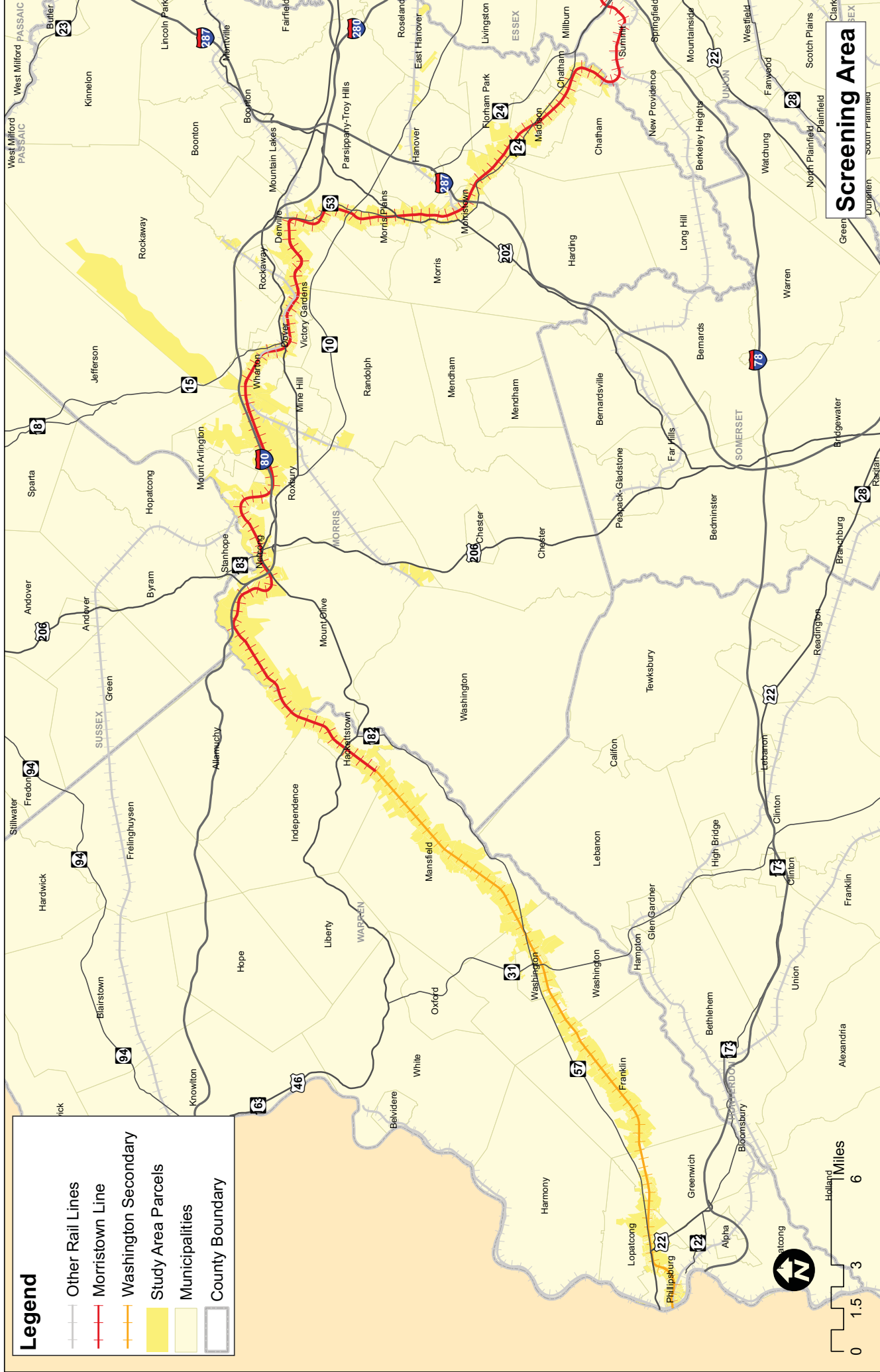
The master property list formed the starting point to screen properties and identify those deemed to have rail-served industrial development potential requiring further investigation. This master list included over 140 individual properties located within ten (10) municipalities along and abutting the Corridor.

C. Phase 1 Property Screening - Highlands and Farmland Preservation Areas

The screening process was designed to identify fatal flaws and significant constraints to future development and allow elimination of individual properties or extended regions from further study consideration. Land use data for parcels included in the Master Property List were analyzed to identify locations where freight development or redevelopment would be enhanced by an improved rail corridor.

The first step of the land use analysis included creating a 2000-foot buffer along the Corridor, as shown on Figure VI.2. Some properties that were included in the master property list but were located outside the 2000-foot buffer were added to the screening area as well. The result was a set of parcels that were either previously identified as potentially-developable or were considered potentially developable due to their proximity to the Corridor (within the 2000' buffer). Subsequent steps in the analysis involved the application of specific screening criteria including: Highlands, farmlands, property size, land use capability map zone (LUCZ), known hazardous materials incidents, natural resources, cultural resources, and land use and zoning. GIS data from the New Jersey Department of Environmental Protection and New Jersey Highlands Council was reviewed for the Initial Screening. The Initial Screening area is depicted on Figure VI.2, with the three-phase screening process summarized in Appendix A.

Figure VI.2 - Study Screening Area



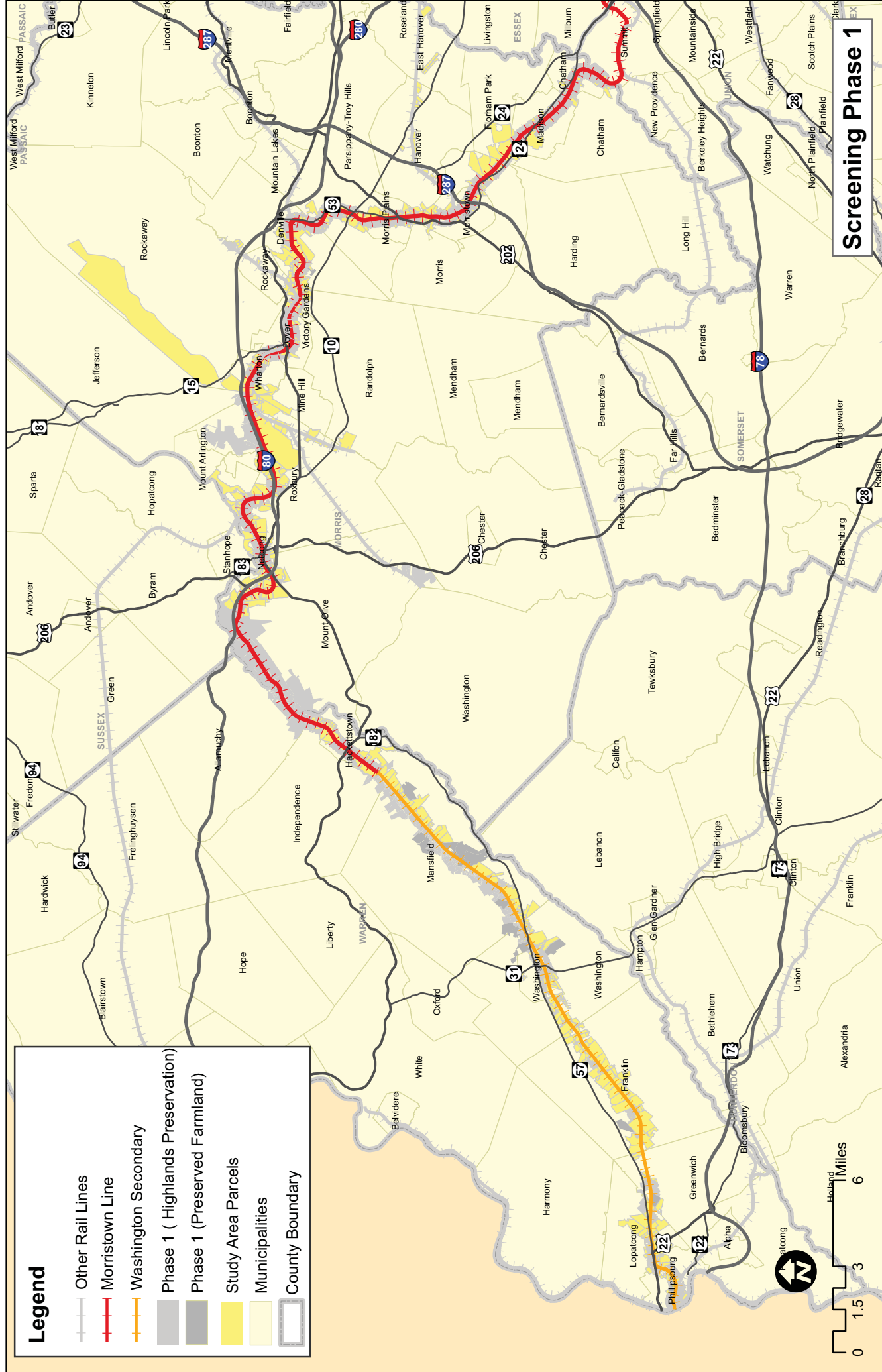
Phase 1 of the screening process involved screening out parcels located within the Highlands Preservation Area, and/or a preserved farmland. Morris and Warren Counties lie within the New Jersey Highlands Region and as such, parcels within the study area are subject to the regulatory provisions of the Highlands Regional Master Plan. Regulatory controls promulgated by the New Jersey Highlands Council prohibit or significantly constrain development of previously undeveloped properties or increases in impervious cover on developed properties over extended areas within each county.

The Highlands Regional Master Plan defines areas with limitation on development as preservation or planning areas. Preservation areas have limited opportunities for development, and as such, properties located within a Highlands Preservation Area were eliminated from further study consideration. Highlands Planning Areas allow development, but still have strict development restrictions and requirements. Parcels located within a Highlands Planning Area were advanced for further investigation.

The New Jersey Department of Agriculture administers the farmland Preservation Program. A significant amount of the agricultural lands within both Morris and Warren Counties have been preserved from future development under this program. Parcels that consist either wholly or in large part of preserved farmlands were eliminated from further study consideration.

If parcels were not located within the Highlands Preservation Area and/or a preserved farmland they were considered to have passed the Phase 1 screening and continued to Phase 2 of the screening process. Parcels that did not pass the Phase 1 screening are highlighted in gray on Figure VI.3.

Figure VI.3 - Phase 1 Screening Parcels

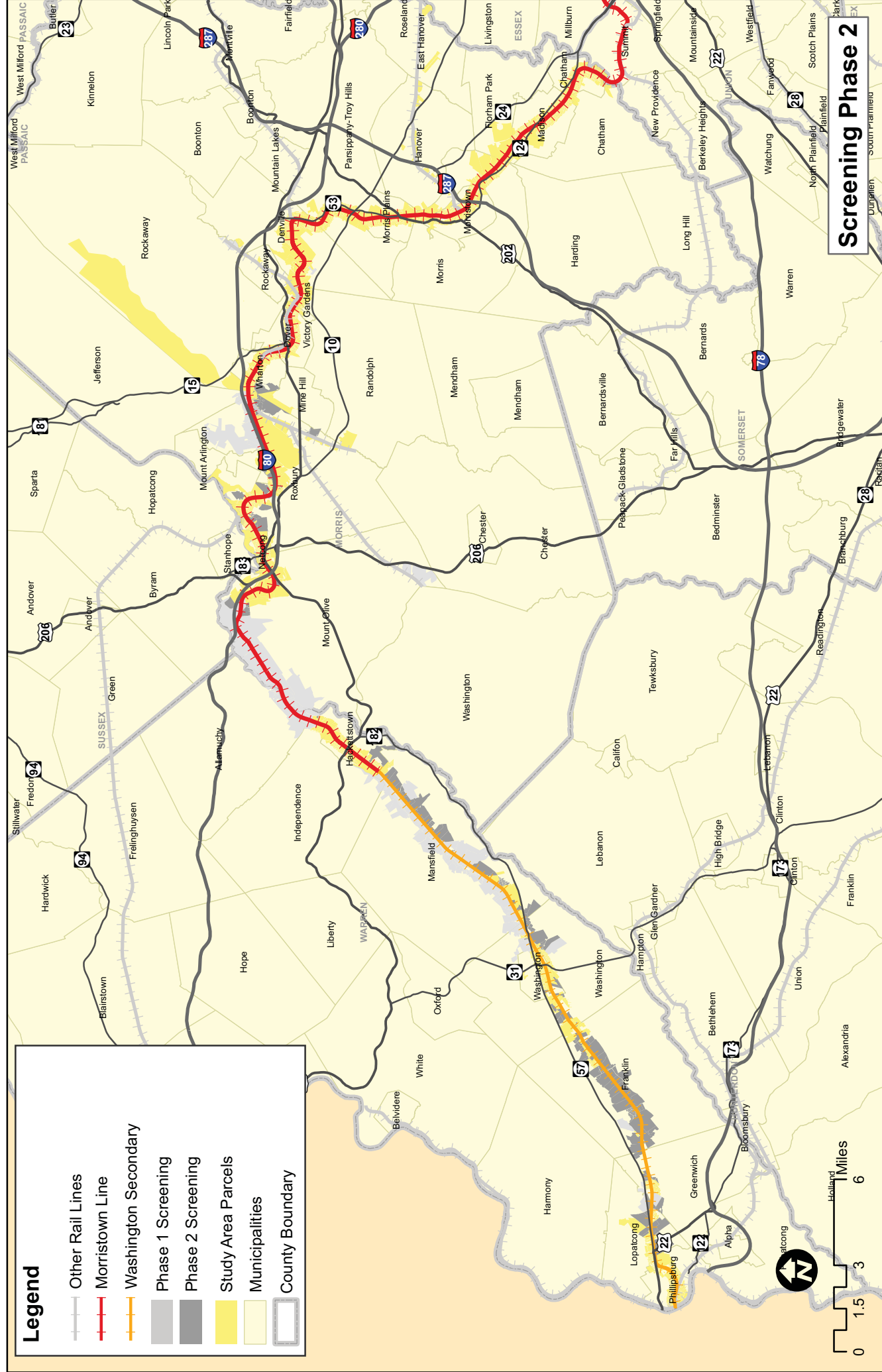


D. Phase 2 Screening - Land Use/Land Cover and Protection Areas

Phase 2 of the screening process examined the Land Use Capability Zone (LUCZ) of each parcel, as well as the NJDEP LULC. Parcels in Phase 2 were immediately screened out if they were categorized in the LUCZ as Protection Zone (LUCZ “Protection Zone” is separate from the Highlands Act Preservation Area, although the two areas routinely can and do overlap). Lands in the Protection Zone are considered high resource value lands and land acquisition and development activities are extremely limited.

Other categories of the LUCZ that were screened out in the Phase 2 Screening process include “Conservation Zone,” and “Wildlife Management Area.” Parcels of land that are categorized as both Urban (under the LULC) and Protection Zone (under LUCZ) were passed to the Phase 3 Screening because of the development potential. These parcels, although in the LUCZ Protection Zone category, were considered to have less stringent land acquisition requirements and, as a result of urban features, are relatively easy to develop. Parcels that did not pass the Phase 1 and Phase 2 screening are highlighted in gray on Figure VI.4.

Figure VI.4- Phase 2 Screening Parcels



E. Phase 3 Screening - Known Contaminated Sites, Natural Resources, Cultural Assets and Zoning








Parcels that were advanced through the Phase 1 and Phase 2 screening for further investigation were analyzed to determine the existence of a range of environmental conditions that would preclude, or at least be a significant obstacle to future industrial development. The Phase 3 screening process included a review of potentially contaminated sites, natural resources (wetlands, stream classification), and habitat data for endangered and threatened species.

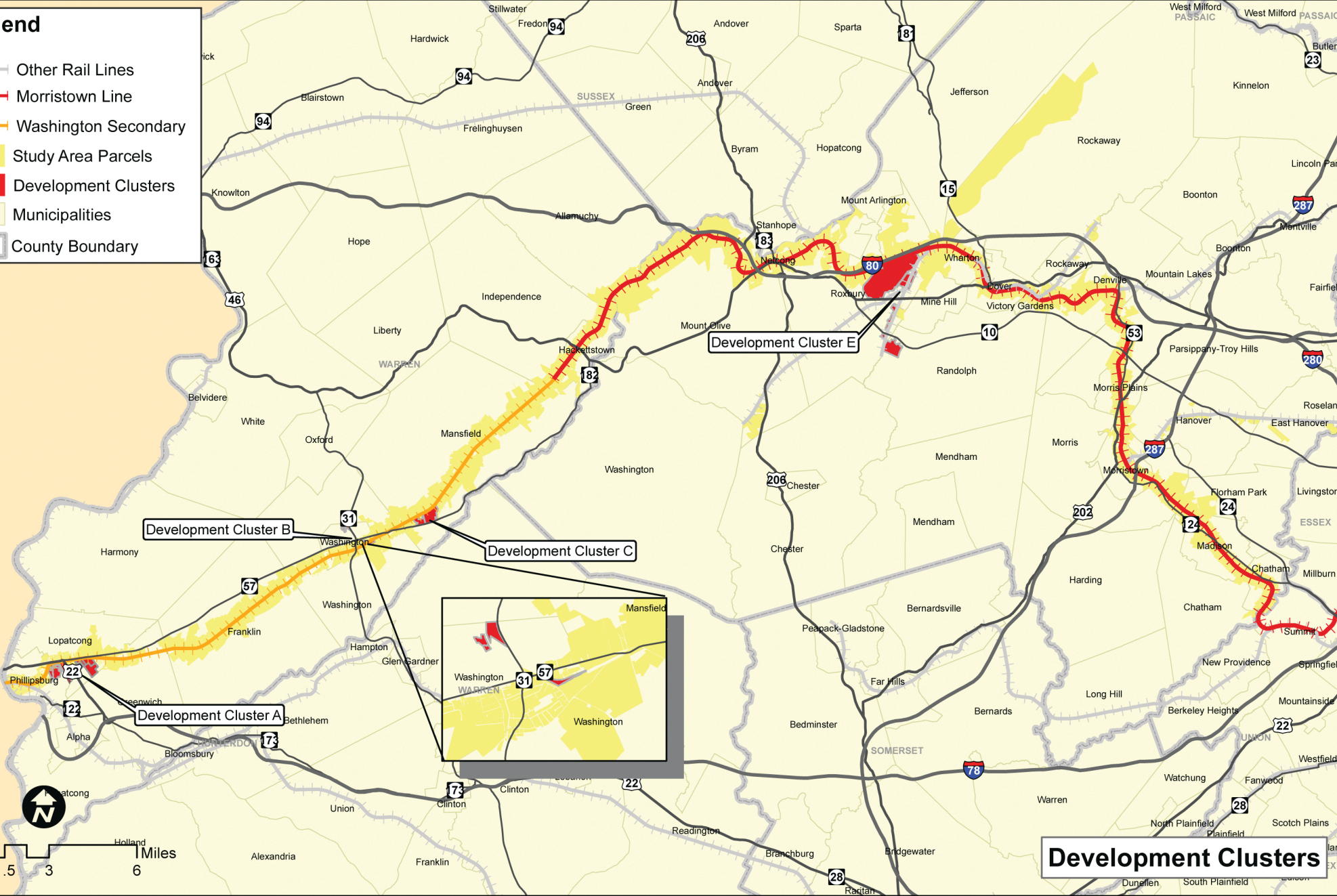
The results of this screening identified a set of property clusters that were deemed to be readily available for industrial development, and are not significantly constrained by environmental conditions. Two field visits were conducted, on January 8, 2013 in Warren County and January 18, 2013 in Morris County, to verify the findings of the screening investigation, and to note the land uses and conditions surrounding the sites. Key issues related to each parcel evaluated in the field included such potential constraints to industrial development as the ability of trucks to access the property (truck-appropriate roadways serving the sites, low clearance or weight restricted bridges, etc.), proximity to possible sensitive receptors such as schools, parks and residential communities, steep grades on the properties, etc.

Parcels deemed to have significant challenges to future development related to truck access, surrounding land uses and topography were eliminated from further consideration. The remaining sites were grouped into clusters based on their proximity to each other, as illustrated in Figure VI.5. These clusters include parcels located within the Town of Phillipsburg and Lopatcong Township (Cluster A), Washington Borough (Cluster B), Mansfield Township (Cluster C), and Roxbury Township (Cluster D).

Figure VI.5- Development Clusters

Legend

-  Other Rail Lines
-  Morristown Line
-  Washington Secondary
-  Study Area Parcels
-  Development Clusters
-  Municipalities
-  County Boundary



Development Clusters

F. Municipal and Property Owner Outreach

It was left to determine if future development of the properties within these clusters with rail-served industrial uses was consistent with the planning goals and visions of the municipalities within which the properties reside, as well as the owners of the properties themselves. Municipal officials representing the municipalities within which the selected parcels reside were contacted to seek concurrence with the properties continued advancement in this study. Property owners, or planning/engineering professionals representing the property owners, were also contacted to determine the consistency of their plans for the properties with the objectives of this study to support rail served industrial development. The following sections detail the final quantified development potential developed for each of the four (4) identified property clusters.

G. Selected Development Clusters

1. Phillipsburg/Lopatcong

This property cluster, as depicted in Figure VI.6 is located within two (2) municipalities: the Town of Phillipsburg and Lopatcong Township. The land use land cover of this development cluster consists of a mix of current and former industrial development and agriculture lands. The rail line runs along the northern boundary of the cluster. U.S. Route 22 and NJ Route 57 are also located to the north of the development site providing roadway access.

The portion of this cluster within Phillipsburg, illustrated in Figure VI.6, within Phillipsburg is part of the Ingersoll Rand Redevelopment Study. The Ingersoll Rand Redevelopment Study is an undertaking by the Town of Phillipsburg and is part of the Highlands Center Planning Process. Coordination with municipal officials and review of the Ingersoll Rand Redevelopment Study identified a potential for approximately 2.075 million square feet of net new industrial development.

The portion of the cluster located in Lopatcong Township consists of two distinct sections. The first section is part of the Ingersoll Rand property and is adjacent and connected to the Phillipsburg portion of the cluster. This property is approximately 103± acres and is part of the Lopatcong Redevelopment Plan, which calls for a mixed-use project with retail, office, and civic uses. While the Lopatcong portion of the Ingersoll Rand site was identified through this study as having high potential for industrial development, discussions with municipal officials from Lopatcong Township indicated their intent to advance development with residential and

commercial uses. Accordingly, the Ingersoll Rand property within Lopatcong Township was eliminated from further consideration in this study.

An additional portion of the properties in this cluster is located in Lopatcong Township abutting NJ Route 57. These properties are bisected by Strykers Road, which provides access to NJ Route 57. Discussions with municipal officials as well as individual property owners within this cluster revealed little immediate interest or support for redevelopment with rail served industrial uses. Accordingly, these properties were also eliminated from further consideration in this study.

2. Washington Borough

The Washington Borough development cluster, illustrated on Figure VI.7 consists of the parcel currently operated by Norfolk Southern as the Washington Rail Yard, and six (6) individual parcels located along a rail spur that was once served out of Washington Yard. The right of way and infrastructure of the rail spur still exists and could be readily rehabilitated and placed back into service to serve these properties.

The six parcels are categorized as Urban under the land use land cover, and consist of approximately 44± acres, portions of which contain active light industrial uses. The remaining properties are currently vacant former industrial sites. Collectively, it is estimated that the potential exists for approximately 6± acres of net new industrial development within this cluster.

Figure VI.6- Town of Phillipsburg/Lopatcong Township Development Cluster

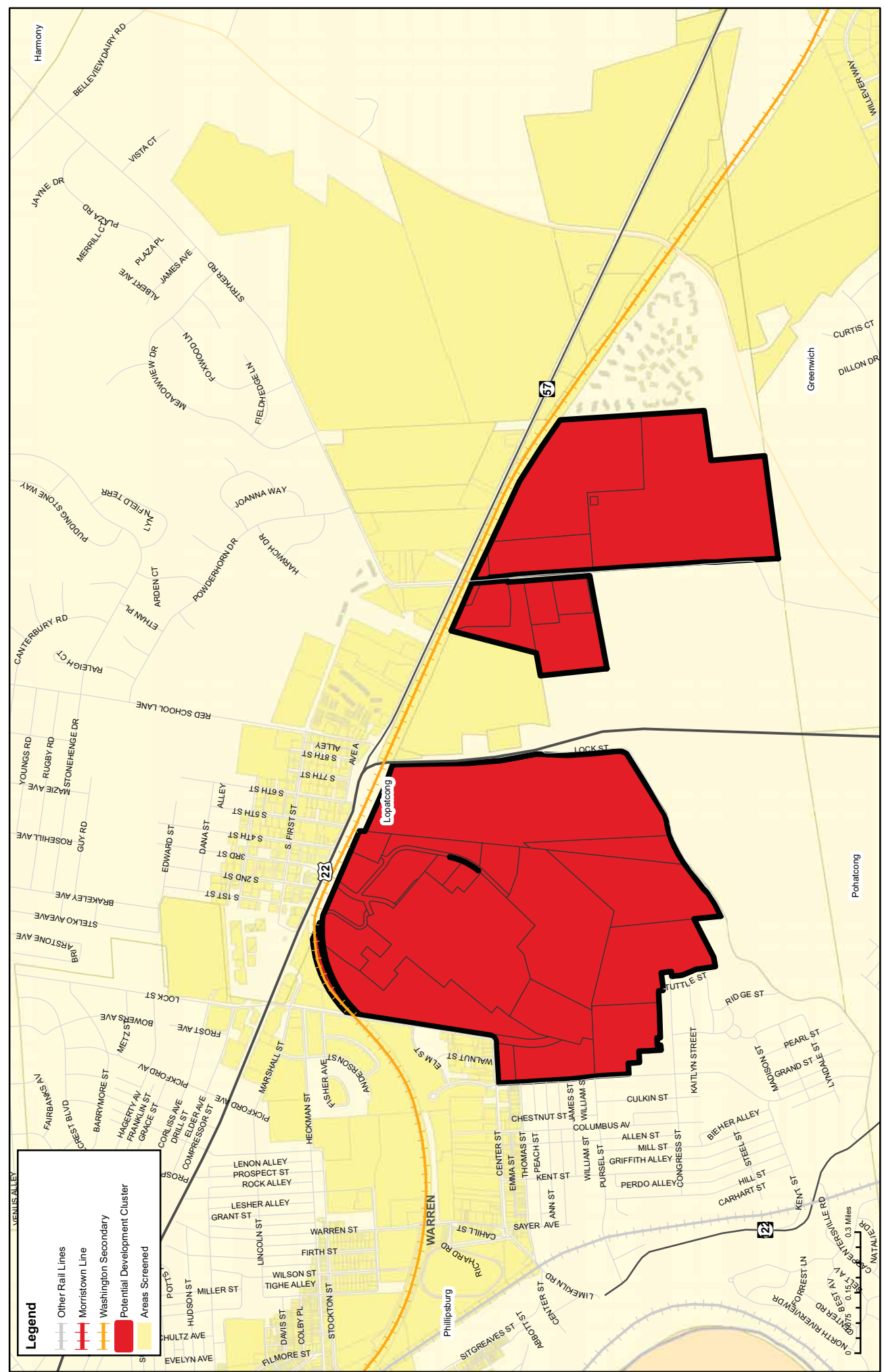
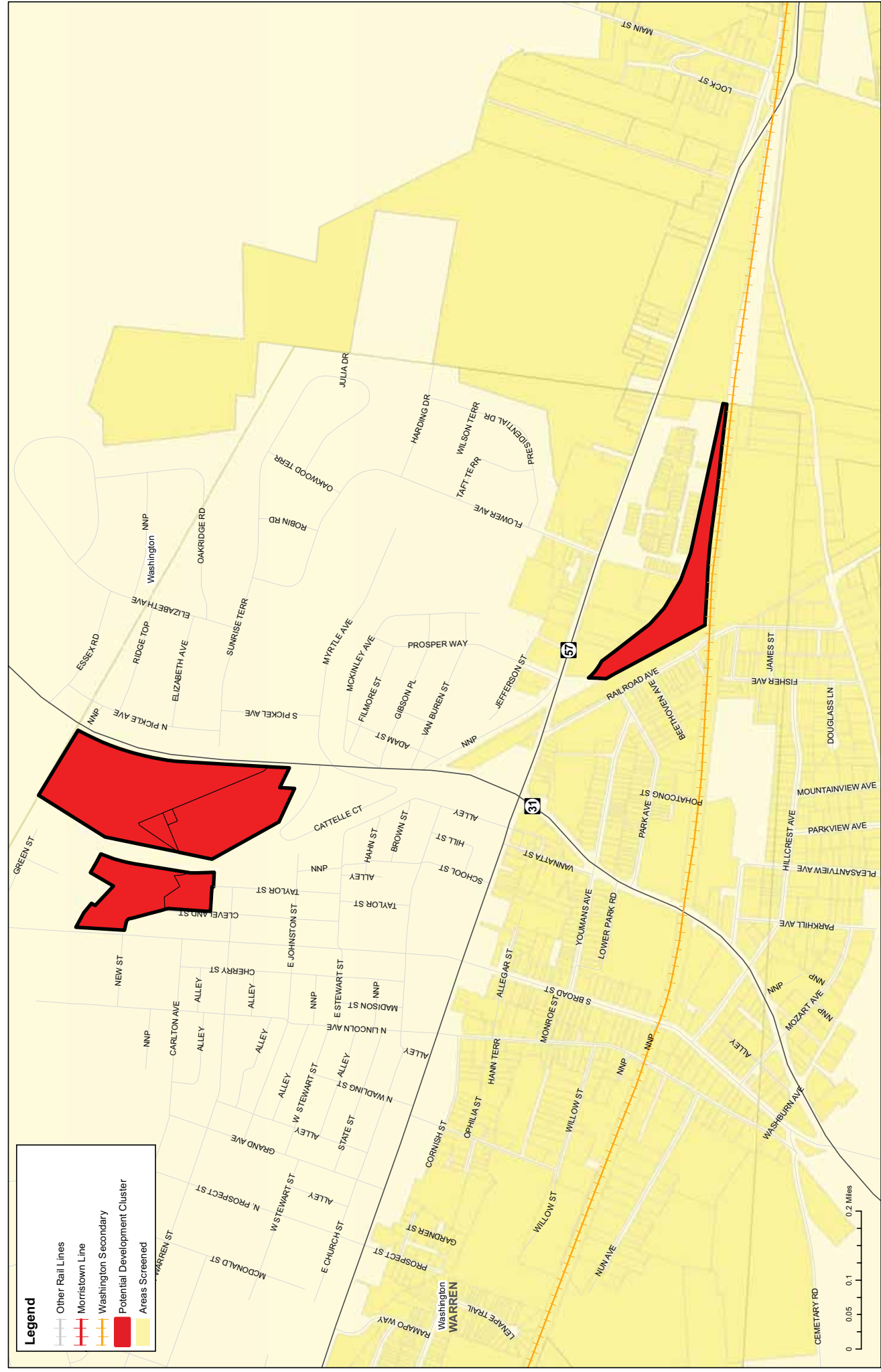


Figure VI.7 - Washington Borough Development Cluster



3. Mansfield Township

The Mansfield Township development cluster, illustrated on Figure VI.8, consists of three parcels totalling approximately 145± acres. A portion of the site is occupied by existing industrial development. This existing activity combined with wetland areas and zoning regulations leave a potential for approximately 17.5± acres of net new industrial development. The land use land cover of these parcels are categorized as forest, urban, and agriculture. The three parcels abut the Washington Secondary Line to the north and NJ Route 57 to the south.

4. Roxbury Township

The Roxbury Township development cluster, illustrated on Figure VI.9, consists of 14 parcels totalling 1,017± acres. This cluster is bisected by U.S. Route 46 and is located immediately south of Interstate 80. The land use land cover of this development cluster consists primarily of forested area, urban area, and wetlands. The former Hercules Property makes up the vast majority of this property cluster (over 975 acres) and abuts the Corridor as well as the High Bridge/Chester Branch. Coordination with municipal officials and representatives of the property owner identified a maximum development potential of up to 7 million square feet of industrial development on this property. An additional property located in Kenvil along the eastern side of the Chester/High Bridge branch currently has preliminary municipal site plan approval for up to 200,000 square feet of industrial space.

While the Hercules property is located adjacent to the Morristown Line, additional properties within this cluster are located along and adjacent to the Chester Branch south of US Route 46. Most of these properties are currently developed, and while there is the potential to provide freight rail service to these properties, they were not deemed to represent a significant potential for net new rail served development. Accordingly, these properties were excluded from further consideration, with the exception of one existing rail served business that has the potential for facility expansion.

Figure VI.8 - Mansfield Township Development Cluster

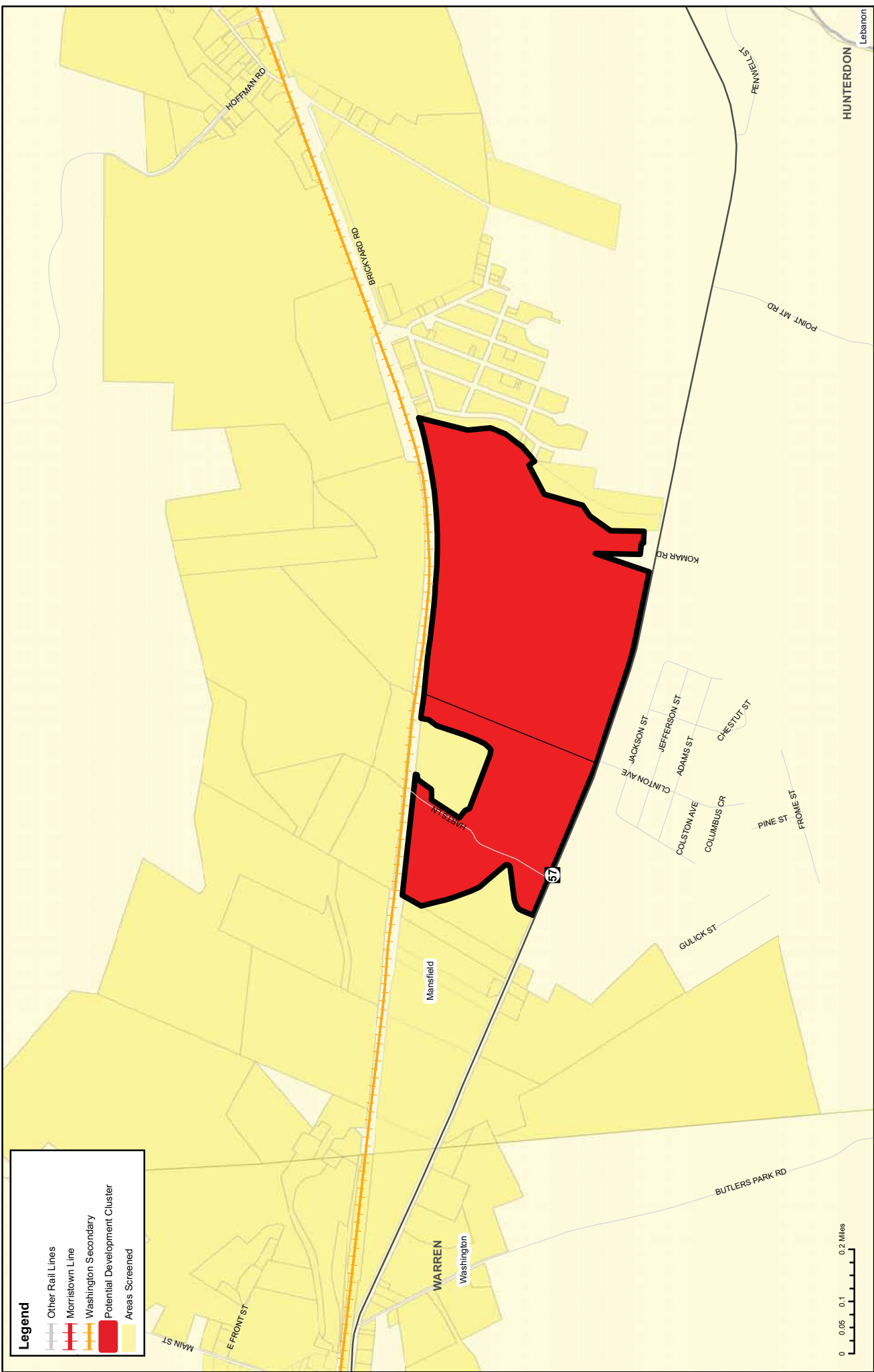
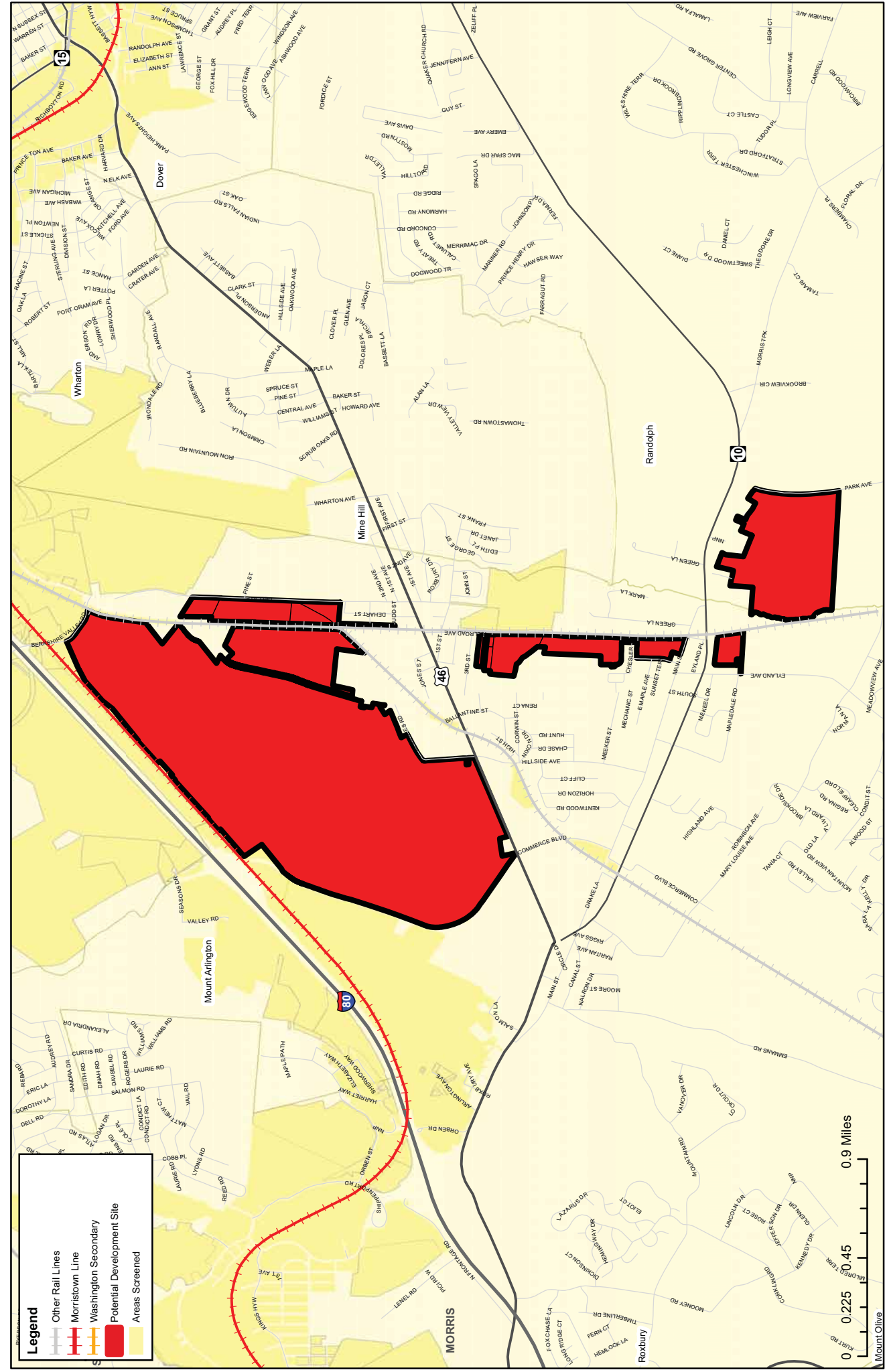


Figure VI.9 - Roxbury Township Development Cluster



H. Industrial Development Potential

1. Maximum Development Density

To determine appropriate levels of development potential for each selected cluster, the project team reviewed unique land use and zoning regulations for the municipality with jurisdiction over the selected clusters. Regulations reviewed included minimum lot acreage, maximum lot coverage, front, side, and rear setback requirements, floor area ratio (FAR), and maximum building height, as shown in Table VI.1.

FAR and maximum lot coverage information was not available for Washington Borough and Mansfield Township; therefore the analysis applied value equivalent to similar municipalities within the project area, as illustrated in Table VI.1.

Table VI.1 - Municipal Land Use Regulations

Municipality	Zoning Classification	Min Lot (acres)	Setback requirement			Floor Area Ratio	Max Lot Coverage
			Front Yard (ft)	Side Yard (ft)	Rear Yard (ft)		
Phillipsburg Town	Heavy Industrial	0.92	35	30	35	0.84	70%
Washington Borough	I	N/A	50	20	25	0.25	50%
Mansfield Township	I	N/A	50	50	50	0.25	50%
Roxbury Township	I-3 Limited Industrial	3.0	100	50	50	0.25	55%

N/A = Not Available for the respective municipality

The land use assumptions facilitated calculation of the approximate amount of building square footage that could be developed for each site, based on the total lot size and wetland impacts for each cluster, as shown in Table VI.2.

Developable square footages were not calculated for locations where readily available previous studies had determined this number. For the Phillipsburg/Lopatcong Cluster, the Town of Phillipsburg's *Ingersoll-Rand Redevelopment Study* targets a net increase in industrial development of approximately 2,075,000 square feet.

The Roxbury Township Cluster consists primarily of the former Hercules site with over 975 acres investigated for redevelopment. Through discussions with representatives of Roxbury Township and the owner of the property, it was determined that the former Hercules property

holds the potential for development of up to 7.0 million square feet of industrial, commercial and residential space. The potential exists for an additional 0.25 million square feet of industrial development potential across the other parcels within the cluster.

Table VI.2 - Cluster-Specific Developable Building Square Footage

Cluster	Total Lot Size (sf)	Wetlands (sf)	Net Lot Size (sf)	Lot Coverage Factor	Max Lot Coverage (sf)	FAR/ Height Factor	Developable Building Size (sf)
Phillipsburg (1)	9,473,588	149,237	9,324,351	0.70	6,345,789	0.84	2,075,000
Washington Borough (2)	1,917,729	0	1,917,729	0.50	958,865	0.25	239,716
Mansfield Township (3)	6,313,325	149,802	6,163,523	0.50	3,081,762	0.25	770,441
Roxbury Township (4)	43,823,102	9,104,737	34,718,365	0.55	20,260,179	0.25	7,250,000
TOTAL							10,335,157

(1) Phillipsburg – Developable Building Size derived from Ingersoll-Rand Redevelopment Study

(2) Roxbury Twp – Developable Building Size estimated by Maser Engineering, consultant to Ashland Chemical Corp.

(3) Mansfield Twp - Zoning code not available - assumed 50% impervious coverage and 0.25 FAR

(4) Washington Borough - Zoning code not available - assumed 50% impervious coverage and 0.25 FAR

The developable building square footage for the Washington Borough and Mansfield Township Clusters were calculated based on an FAR of 0.25 applied to the maximum lot coverage area within a net lot size. As noted above, the maximum lot coverage percentage and FAR regulations for industrial uses within Washington Borough and Mansfield Township were not available, therefore an assumed maximum lot percentage of 50 percent and an FAR of 0.25 were used.

I. Proportion of Development Potential Attributable to Improved Rail Access

Many industrial businesses and business clusters are developed in areas without rail accessibility and rely solely upon trucks for the import of raw materials and the export of finished products. Many similar businesses are in operation abutting rail corridors but are not utilizing rail due to the nature of their business. Future industrial development to be advanced within the four identified property clusters is no exception. It is recognized that not all industrial businesses developed within the property clusters will be, can be, or need to be rail served.

As detailed in Chapter VII, economic impact models were developed for projection of the economic value and benefits of improving the Corridor to accommodate 286K Plate “F” rail service. As input to the economic impact models, the proportion of the total development potential that could attract rail served uses was estimated. These estimates were based upon:

- Review of current and ongoing redevelopment studies and planning activities that encompass the property clusters in Phillipsburg and Roxbury.
- Discussions with officials representing Corridor municipalities.
- Discussions with industrial real estate brokers to determine the types of industries expressing interest in development sites within New Jersey.
- The make-up of comparable mixed use industrial centers located along or served by a freight railroad.
- Input from members of the Technical Advisory Committee, particularly the County Planning professionals.

Based upon these discussions and document review, the proportion of the potential future development that could be attributable to the creation of 286K Plate “F” rail service along the Corridor was estimated for each property cluster. These estimates are summarized in Table VI.3.

Table VI.3 - Proportion of Potential Development by Rail Served Industries

Development Cluster	Developable Building SF	Percent Attributable to Rail	Total Attributable to Rail
A - Phillipsburg	2,075,000	57%	1,180,000
B - Washington	239,716	54%	130,000
C - Mansfield	770,441	43%	330,000
E - Roxbury	7,250,000	23%	1,670,000
Total	10,335,157	32%	3,310,000

As shown in Table VI.3, approximately 32 percent of the 10.3 million square feet of development potential within the four identified property clusters could be expected to be developed with rail-served businesses. The translation of this rail served industrial development potential into annual economic value is detailed in Chapter VII of this report.

VII. ECONOMIC IMPACTS

A. Economic Impact Modeling Methodology

1. Background on Economic Impact Modeling Technique

Input-output (I-O) modeling is among the most accepted means for assessing economic impacts. The approach provides a concise and accurate means for articulating the interrelationships among industry sectors. I-O modeling focuses on the interrelationships among sectors in an economy. Within the I-O model, the economy of an area is mapped out in table form, with each industry listed across the top as a consuming sector (or market) and down the side as a producing sector.

The basic framework for I-O analysis originated nearly 250 years ago when François Quesenay published *Tableau Economique* in 1758. Quesenay's "tableau" graphically and numerically portrayed the relationships between sales and purchases of the various industries of an economy. More than a century later, his description was adapted by Leon Walras, who advanced input-output (I-O) modeling by providing a concise theoretical formulation of an economic system (including consumer purchases and the economic representation of "technology"). Wassily Leontief greatly advanced Walras's theoretical formulation and was awarded the Nobel Prize in 1973. The federal government immediately recognized the importance of Leontief's development and has been publishing input-output tables of the U.S. economy since 1939.

The models can be quite detailed. The current U.S. and IMPLAN models have more than 400 industry sectors. This level of detail provides a consistent and systematic approach, as well as a more accurate means for assessing the multiplier effects of changes in economic activity.

I-O Analysis makes several key assumptions. First, the information used to create an input-output model is for *a given point in time*. The information in the model reflects a "snapshot" of the technical requirements and industry relationships at a given point in time. Because of this, input-output models are regularly updated.

Regional input-output models, such as the one used in this economic impact assessment, need to account for the percentage of the demand for an industry's output or the requirements for a transportation project that can be readily supplied by firms within the specified region. Firms within the specified region may not be able to supply all the products needed. Therefore,

goods and services may need to be purchased from outside of the specified region. The default “regional purchase” coefficients within the IMPLAN model were used for this analysis.

2. Approach and Models Developed

The team constructed multi-regional input-output models for this assessment using the IMPLAN version 3.0 software. IMPLAN is a complete economic assessment package including data and software with detailed documentation. More information on IMPLAN can be found at <http://implan.com/V4/>. An overview of Input-Output modeling, the IMPLAN software and its application is presented in Appendix B of this report.

Multi-Regional Input-Output models (MRIO) capture the economic impacts occurring in several connected economic regions, along with “trade flows.” Trade flows are defined as the purchase of goods and services among each of the identified regions. In addition to the trade flows, the models consider and reflect the purchase of goods and

services from sources outside the identified regions. These “leakages” reduce impacts. For example, some suppliers and workers may come from outside of New Jersey. The impacts associated with these expenditures accrue to the locations outside of the State rather than to New Jersey.

The economic impacts associated with each of the development scenarios in the project are identified for each of the regions. For this project, the impacts of new industrial developments in Morris and Warren Counties were assessed at the County, NJTPA and New Jersey State levels. The geographic areas are shown in Figure VII.1.

The four (4) MRIO models developed for this project were:

- **Morris Model** – the three regions included are Morris County, the NJTPA region and the State of New Jersey, with impacts originating in Morris County. Impacts are shown at

Figure VII.1 - Geographic Areas in the Assessment – Morris and Warren Counties, the NJTPA Region and the State of New Jersey



the Morris, NJTPA and New Jersey levels. The impacts shown are total impacts at each geographical level.

- **Warren Model** – the three regions included are Warren County, the NJTPA region and the State of New Jersey, with impacts originating in Warren County. Impacts are shown at the Warren, NJTPA and New Jersey levels. The impacts shown are total impacts at each geographical level.
- **Morris-Warren model** – the two regions included are Morris and Warren Counties, with impacts originating in Morris County. Impacts are shown for each of the Counties along with the two counties in total.
- **Warren-Morris model** – the two regions included are Morris and Warren Counties, with impacts originating in Warren County. Impacts are shown for each of the Counties along with the two counties in total.

The resulting models are the economic impact basis for the customized Impact Calculator models developed for this project. MRIO analyses require several considerations and reviews beyond single region economic impact models:

- Regions within an MRIO model are separate and do not overlap. For example, in the Morris Model, the NJTPA region within the MRIO model excludes Morris County, and the New Jersey State model excludes both Morris County and the NJTPA region. If Morris County had been included in the NJTPA region, then a duplication of impacts would have occurred.
- In general, the economic characteristics within each region in a MRIO model should be standardized. For example, employment/output ratios should be the same to ensure that trade flows (purchase of goods and services) reflect typical market area conditions. Individual regions can have different ratios. The differences increase as the size and diversity of the regions increase (e.g., the US ratio may be different than the NJ ratio for a given industry because the wages paid and cost of living in different areas of the US vary). For this project, all of the regions are within the State of New Jersey. As such, it is assumed that the majority of the economic characteristics in the individual regions within the MRIO model are sufficiently similar.

3. Definitions

The economic impact assessment estimates the total impacts, which are defined to include:

- **Direct** – the spending at the site of the development. Direct effects are the focal point of an impact analysis.

- **Indirect** – the purchases of goods and services by suppliers. By definition, the first round of indirect impacts includes the purchase of supplies and services that are required to produce the direct effects. Subsequent purchases of supplies and services generate other rounds of indirect impacts. Such purchases continue to ripple through the economies of each of the regions in the MRIO model.
- **Induced** – the purchases (of such items as food, clothing, personal services, vehicles, etc.) that arise, in turn, from the increase in the aggregate labor income of households.

The **total economic impact** consists of the direct, indirect and induced effects. The economic measurements included in this analysis are:

- **Employment Effects** –Jobs generated or supported , including:
 - Direct employment: onsite full- and part-time equivalent jobs or jobs in the initial Industry/business development.
 - Total employment: The total number of full-time equivalent jobs (direct, indirect and induced) generated in each of the geographically defined regions.
 - **Business Output/Revenue** – Output represents the value of industry production. In IMPLAN, these are annual production estimates for the year of the data set and are in producer prices. For manufacturers this would be sales plus/minus change in inventory. For service sectors production = sales. For retail and wholesale trade, output = gross margin and not gross sales.
 - **Personal Income Effects** – Includes all forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income.
 - **State and Local Tax Effects** – defined as revenues collected by state and sub-state governments. The taxes include employee, personal, proprietor, business, household and corporate taxes.
 - **Federal Tax Effects** – defined as revenues collected by the federal government from corporate income, personal income, social security, and excise taxes.
- 4. Translating Development Scenarios into the Initial Impact Scenarios for Impact Analysis**

A five-step process was employed to translate each development scenario:

- Obtain total square footage by type of industry.
- Use average workers per 1,000 square feet ratios to translate the square footage into anticipated direct employment for each industry type.

- Translate the industry types into the corresponding IMPLAN sectors.
- Use the anticipated direct employment by IMPLAN sector as the starting point for the economic impact assessment.
- Enter information into the MRIO models constructed for this project.

The industry types were based on a combination of the current mix of rail-served businesses in Morris and Warren Counties, along with successful examples of rail-served businesses elsewhere in New Jersey. The list was discussed and agreed upon by team members and NJTPA staff. Development of the square footage of development potential by industry type is discussed in Chapter VI of this report.

The industrial activity sectors utilized (with the equivalent IMPLAN industry sector) were:

- Food Product Manufacturing – IMPLAN Sector 62 (Bread and bakery product manufacturing)
- Wood Product Manufacturing – IMPLAN Sector 99 (Wood windows and doors and millwork manufacturing)
- Paper Production – IMPLAN Sector 107 (Paperboard container manufacturing)
- Plastics Manufacturing – IMPLAN Sectors 148 (Plastics bottle manufacturing) and 149 (Other plastics product manufacturing)
- Metal Products Manufacturing – IMPLAN Sector 187 (Ornamental and architectural metal products manufacturing)
- Lumber Wholesale/Retail - – IMPLAN Sectors 323 (Retail Stores - Building material and garden supply) and 319 (Wholesale trade businesses)
- Warehousing – IMPLAN Sector 340 (Warehousing and storage)

The team conducted research to quantify the typical number of workers (full time equivalents) per thousand square feet for the different industry types. The key sources identified and considered are summarized in Table VII.1. All of the manufacturing sources were further reviewed to consider anticipated increases in productivity in new business operations, which were then factored into the final employment rates. The full time employee equivalents per 1,000 sf by industry type utilized in the economic impact modeling are summarized in Table VII.2.

Table VII.1 - Manufacturing and Warehousing Workers Per 1000 SF – Data Sources

Source	Ratio	Website
Stockyard reuse study	Food processing – 1.74 Metals mfg – 1.01 Plastics – 2.15 Chemicals – 1.94 Ind. Mach. – 1.68 DC - .78	http://renewthevalley.org/media/mediatile_attachments/00/150-stockyardsdesignandeconomicimpactguidelines.pdf
Sandag – Manufacturing/Ware/Ind	2.6954	http://www.lbusd.k12.ca.us/Main_Offices/Business_Services/docs/dev_fees/Commercial%20FSCID_12440-3601_FN.pdf
U Delaware – extrapolated for 2000	1.83	http://dspace.udel.edu:8080/dspace/bitstream/handle/19716/4279/DelMultipliers.pdf?sequence=1
BRAC Fort Bragg - manufacturing	1.79	http://www.bractrf.com/documents/AppendixBLevelofService-CostandRevenueFactors.pdf
BRAC Fort Bragg – light industrial	2.31	http://www.bractrf.com/documents/AppendixBLevelofService-CostandRevenueFactors.pdf
NJ Demographic Multipliers – Manufacturing	1.0-2.0	http://nj.gov/state/planning/docs/njdemomultipliers.pdf
NJ Demographic Multipliers – warehousing	0.2-0.8	http://nj.gov/state/planning/docs/njdemomultipliers.pdf
Energy Star – Warehousing main shift	0.59	https://www.energystar.gov/istar/pmpam/help/Warehouse_Space_Use_Information.htm
A. Strauss-Wieder, Inc. – warehousing and distribution centers	0.3-1.0	Based on numerous site visits & on activities occurring within warehouses & distribution centers. Generally, the more shifts, value added activities and order fulfillment that takes place in a building, the greater the number of workers/ 1,000 sf. The numbers consider permanent, contract and seasonal workforces at the building.

Table VII.2 - Employment Rates by Industry Type

Industry Type	Existing Examples	Employees per 1,000 sf
Food Product Manufacturing	Royal Flour, Goya	1.58
Wood Product Manufacturing	Ace Pallets, Pre-Fabricated Furniture	1.00
Paper Production	Holland Manufacturing	1.00
Plastic Products Manufacturing	TriPak, Berry Plastics, Borealis	1.76
Metal Products Manufacturing	Former Ingersoll-Rand	1.00
Lumber Wholesale/Retail	Kuiken Lumber	1.58
Warehousing	NYK/Yusen, Cherrybrook	0.30

B. Value of Rail Served Industrial Development In Morris And Warren Counties

Each development cluster was analyzed in terms of its maximum economic impact. Maximum economic impact is defined as the economic value that results when a development cluster is fully built out and fully occupied by companies new to the County, NJTPA region and State of New Jersey.⁵ The square footages were allocated at each of the sites among the industry types, based upon a review of the major redevelopment plans addressing properties within the development clusters and the general distribution of existing industries in the region resulting in the scenarios summarized in Table VII.3.

Table VII.3 - Distribution of Development by Industry Types

Development Cluster	Development Attributable to Rail	Rail-Served Development by Industry Sector						
		Food Products	Wood Products	Paper Products	Plastic Products	Metal Products	Lumber Wholesale/ Retail	Warehouse
Phillipsburg	1,180,000	177,000	118,000	0	118,000	177,000	177,000	413,000
Washington	130,000	97,500	0	0	0	0	15,600	16,900
Mansfield	330,000	39,600	0	0	75,900	33,000	0	181,500
Roxbury	1,670,000	167,000	33,400	83,500	167,000	83,500	200,400	935,200
Total	3,310,000	481,100	151,400	83,500	360,900	293,500	393,000	1,546,600

The development square footage estimates were translated into the associated on-site workers by development type. This information was then used as inputs for the MRIO models and economic impact assessments.

The economic impact results, while examples of the benefits that could accrue to the municipalities, County and State if the sites were redeveloped, provided an indication of the value of pursuing new business uses and, where appropriate, transportation improvements. The variety of potential uses, based on consultant team reviews and extensive discussions with municipal organizations, helped illustrate possible future directions and opportunities. The potential economic value of new development attributable to improved industry standard freight rail access is summarized in Table VII.4.

⁵ This is an acceptable approach because the economic impacts are being used solely to illustrate and compare possible scenarios at the selected sites. In reality, at least some of the businesses that would locate at a given location may be relocating or expanding from locations elsewhere in the County, region or State. With a relocation, there is no new net economic impact if the business does not add workers or expand their operations, although the availability of the site made the retention of the business possible.

Table VII.4 - Potential Maximum On-Going Economic Benefits that Could Accrue if the Development Clusters are Fully Developed and Occupied

Benefit Type (1)	Economic Benefits		
	Morris-Warren Counties	NJTPA Region	New Jersey
Direct employment	3,009	3,009	3,009
Total employment	4,816	5,675	5,718
Personal income (in millions \$)	\$ 298.59	\$ 353.74	\$ 356.41
Business activity (in millions \$)	\$ 893.20	\$ 1,059.06	\$ 1,072.79
State and Local Taxes (in millions \$)	\$ 41.70	\$ 50.84	\$ 51.31
Federal Tax Revenue (in millions \$)	\$ 70.27	\$ 83.61	\$ 85.02
Total Tax Revenue (in millions \$)	\$ 111.97	\$ 134.45	\$ 136.33

(1) Values are in 2013 dollars and would accrue annually

While the economic impact assessments conducted for this study focused on potentially new rail-oriented industrial development that could occur in Morris and Warren Counties, it is equally important to note the value of retaining existing rail-served businesses in the area. The inability to use industry standard 286K Plate “F” railcars can increase transportation costs for existing businesses as well as limit the competitiveness of existing sites and the ability to retain such businesses. Each business lost takes with it employment, tax revenues and other economic value.

Table VII.5 presents some representative samples of the economic losses that would accrue to the region if industrial businesses were to cease operation or relocate outside of New Jersey. As shown, the loss of 100,000 square feet of warehousing and distribution space would result in the loss of approximately 49 jobs (30 direct jobs and an additional 19 indirect jobs). This equates to a loss of approximately \$3 million in personal income annually, and just over \$0.9 million in local, state and federal tax revenue. Loss of more intensive industrial activity would result in even greater economic loss to the region. The loss of 100,000 square feet of plastics manufacturing activity would result in the loss of approximately 299 jobs (176 direct jobs and an additional 123 indirect jobs). This equates to a loss of over \$20 million in personal income annually, and nearly \$6.9 million in local, state and federal tax revenue.

Table VII.5 - Potential Loss of Economic Value due to Loss of Business Activity in the Region

Benefit Type	Economic Benefits	
	Warehousing	Plastics Manufacturing
Direct employment	(30)	(176)
Total employment	(49)	(299)
Personal income (in millions \$)	\$ (3.00)	\$ (20.33)
Business activity (in millions \$)	\$ (6.51)	\$ (78.58)
State and Local Taxes (in millions \$)	\$ (0.26)	\$ (2.10)
Federal Tax Revenue (in millions \$)	\$ (0.65)	\$ (4.76)
Total Tax Revenue (in millions \$)	\$ (0.91)	\$ (6.87)

VIII. POTENTIAL FUNDING OPTIONS

New Jersey's ability to address the capital needs of its freight rail system is constrained. Like most other states, New Jersey's needs far exceed available resources and the gap is growing. How New Jersey deals with this issue will influence its potential for economic growth.

Funding availability for infrastructure improvements through NJ TRANSIT is limited, and is expected to continue to be so as the demand for improvements supporting passenger service exceed available funding. The major Class 1 railroads serving New Jersey, including Norfolk Southern, have made substantial investments to improve their mainline facilities, but are generally more hesitant to expand freight rail service into secondary areas like Warren and Morris Counties that need it for their continued economic growth. The Division of Multimodal Services within the New Jersey Department of Transportation regulates and oversees freight rail in New Jersey, but its financial resources are also severely limited.

As with passenger rail, the capital needs associated with necessary freight rail improvement projects far exceed the public funds available for such undertakings. The only state funding source for rail freight projects is the New Jersey Freight Rail Assistance Program. This program, administered by the NJDOT, historically provides \$10 million annually for grants to improve freight rail infrastructure. Three times the annual funding allocation would have been required to satisfy the number of funding applications the program received in 2010 alone. The improvements to the Corridor necessary to accommodate 286K Plate "F" rail service to Warren and Morris Counties could potentially cost three times the annual allocation of funds to the Freight Rail Assistance Program.

A. Public Private Partnerships⁶

In New Jersey, the Department of Transportation currently has a limited ability to enter into public/private partnerships (P3). The only major rail-related P3 projects involving the NJDOT or NJ TRANSIT stemmed from 1997 legislation that authorized a limited number of these initiatives to test the viability of the concept. The Hudson-Bergen Light Rail Line was the first design-build-operate-maintain (DBOM) project of its kind and was a direct result of the law. In 2002, after the original five-year pilot period expired, the P3 legislation was not renewed.

However, in 2010, the New Jersey Privatization Task Force's final report to Gov. Chris Christie endorsed the enactment of broad-based legislation that would allow both the state and local

⁶ Source: New Jersey Statewide Freight Rail Strategic Plan, NJDOT

governments to enter into P3s without requiring state authorization for each individual project. It also recommended that a process be established to entertain unsolicited privatization proposals.

The Commissioner of Transportation has the statutory ability to plan, design, construct, equip, operate, improve and maintain, either directly or by contract with any public or private entity, a railroad, subway, street traction or electric railway, or connecting roadways and facilities for the purpose of carrying freight within the State or between New Jersey and other states.

The Commissioner is also authorized to enter into agreements with public or private entities or consortia for the loan of federal funds appropriated by the NJDOT to finance all or a portion of the costs incurred for the planning, acquisition, engineering, construction, reconstruction, repair, and rehabilitation of a transportation project.

Pending legislation (S510) would authorize the Commissioner of Transportation in each state fiscal year to select any transportation project from the list of transportation projects for which monies have been appropriated in the annual appropriations act to serve as a public-private partnership project. The “public partner” could be the NJDOT or NJ TRANSIT.

Public-private partnership projects could encompass the planning, designing, constructing, equipping, operating, financing, and/or maintenance. Projects would be evaluated on the basis of their overall benefit to the state; the qualifications and financial strength of the private partners and their responsiveness to the public partner's requirements; the total project cost to be incurred by the public partner; the nature of project financing; the revenues to be generated by the project on behalf of and in support of the state; and, the impact of any direct or indirect user fees involved in the arrangement.

Any financial participation by the NJDOT or NJ TRANSIT in a public-private partnership project would be subject to legislative appropriation and the availability of funds. There are numerous private entities that could potentially participate in a public-private partnering including the owning railroads, shippers that utilize rail service along the corridor, existing businesses that receive goods via rail and private developers seeking to enhance the attractiveness and value of their properties for industrial development.

IX. SUMMARY AND CONCLUSIONS

A. Summary of Study Goals

The primary goals of the Morris/Warren County Rail Corridor Study were to:

- Identify the physical constraints – vertical clearance, width clearance and weight limitations on bridges - that restrict the movement of 286K Plate “F” rail cars along the corridor.
- Identify infrastructure improvements to eliminate the identified constraints.
- Estimate the capital costs of making the infrastructure improvements.
- Project the economic benefit that would accrue to Morris and Warren Counties, the NJTPA region and the State of New Jersey due to the enhanced freight rail access that the infrastructure improvements would provide.

The result is an program of individual facility improvements that when completed sequentially from west to east, have the potential to generate new jobs and revenue while supporting the goals of local, county, regional, and state long- and short-range plans.

B. Key Findings

The study identified a total of eight (8) constraints to 286K Plate “F” freight rail service along the Corridor.

Vertical Clearance Constraints

- South Main Street Bridge (MP 80.23) - Town of Phillipsburg
- East Hanover Avenue Road Bridge (MP 31.48) - Morris Plains

Weight restricted Bridges

- Bridge over Grand Avenue (MP 58.00) - Hackettstown
- Bridge over a Cattle Pass (MP 57.49) - Hackettstown
- Bridge over a Drainage/Utility Culvert (MP 57.25) - Hackettstown
- Bridge over Shippenport Road (MP 44.97) - Roxbury Township
- Bridge over the Mill Brook (MP 36.41) - Denville
- Bridge over Franklin Road (MP 35.28) - Denville

Improvements options were identified to eliminate these constraints and provide 286K Plate “F” freight rail access along the Corridor from the Delaware River to the Town of Morristown, as

well as to four connecting branch lines that are accessed via the Corridor. Preliminary cost estimates were developed for the improvements at each of the identified constraint locations. As summarized in table IX.1, the total improvement cost for elimination of all of the identified constraints to 286K Plate “F” rail service is estimated to be in the range of \$18 to \$30 million.

Table IX.1 - Cumulative Cost to Achieve Clearance to Key Junctions along the Corridor

Key Junction	Importance	Required Improvements	Cumulative Cost
Delaware River Crossing	Entry to State and the Morris-Warren Rail Corridor	S. Main Street Bridge	\$1,000 to \$3,000
	Support for Rail Served Development in Phillipsburg		
Washington Yard	Support for Rail Served Development in Washington Borough and Mansfield Township	N/A	\$1,000 to \$3,000
Lake Junction Yard	NS interchange with M&E	Grand Avenue Bridge Cattle Pass Bridge Drain Bridge Shippenport Road Bridge	\$7,000 to \$12,500
Chester Junction	Service Customers along Chester/ High Bridge Branches	N/A	\$7,000 to \$12,500
	Support for Rail Served Development in Roxbury Township		
D&R Junction	Service Customers along Dover & Rockaway Branch	N/A	\$7,000 to \$12,500
Montclair Line	Service Customers along Montclair Line and Totowa Branch	Mill Brook Bridge Franklin Road Bridge	\$17,500 to \$28,500
Whippany Line	Service Customers along Whippany Line	E. Hanover Avenue Catenary Heightening	\$18,000 to \$30,000

Each individual improvement recommendation has independent utility and can be advanced as a series of eight separate projects. However, the maximum value would be achieved through implementation of the entire improvement program.

C. Economic Benefits

Providing improved freight rail access would support the attraction of new and expanded industrial development along the Corridor. Of equal importance, improved freight rail access would support the retention of existing businesses that rely upon rail. The study projected that investing in the Corridor improvements would result in:

- 3.3 million square feet of new rail-served industrial development
- 3,000 new direct jobs in Morris and Warren Counties
- 5,700 new jobs in New Jersey
- \$300 Million in annual personal income
- \$1 Billion in annual business activity
- \$51 Million in annual state and local tax revenue
- \$85 Million in annual federal taxes

D. Recommended Actions

It is clear that the annually recurring economic value that would be derived from a significant growth in the rail served industrial development within Warren and Morris counties far exceeds the estimated capital cost of the required improvements to bring industry standard 286K Plate “F” rail service to the study area. Accordingly, it is recommended that the individual improvements developed in this study be advanced for detailed engineering, design and implementation.

To facilitate the advancement of individual improvements, problem statements have been prepared for each of the eight (8) individual improvements recommended by this study. Any agency or private entity may assume a lead role in advancing one or more of these individual improvements into detailed engineering, design and construction. The problem statements are presented in Appendix C of this report.

APPENDIX A
POTENTIAL RAIL SERVED DEVELOPMENT
PROPERTY SCREENING PROCESS

Table A.1 – Property Screening Process – Phase 1 – Highlands Preservation Areas

Development Criteria	Measurement	Notes
Highlands		
<i>Is this in a Planning Area or Preserved Lands Area</i>	Parcels located in preserved lands category will be a fatal flaw. If Parcels are located in the planning areas, then they will move to Phase 2 Screening.	
Farmlands		
Preserved farmland	Parcels located in the preserved farmland category will be considered fatal flaw. If parcels are not preserved farmland, then they will move to Phase 2 Screening.	

Table A.2 – Property Screening Process – Phase 2 – Land use Capability Map Zone

Development Criteria	Measurement	Notes
Land Use Capability Map Zone		
<i>Protection (high resource value) Conservation (significant agricultural use lands, should be preserved when possible) Existing Community (significant concentrated development)</i>	Parcel will be ranked according to it's LUCZ categorization, parcels that are in the "protection" category will be considered a fatal flaw. Most desirable parcels are those located in the "Existing Community" category.	
Land Use Land Cover	Parcels that are categorized as Urban under NJDEP Land Use Land Cover will be passed to Phase 3 Screening.	These parcels include parcels that are categorized as Urban only or parcels that are simultaneously categorized as urban under the Land Use Land Cover and protection zone under Land Use Capability Map
Urban		

Table A.3 – Property Screening Process – Phase 3 – Known Contaminated Sites, Natural Resources, Cultural Assets and Zoning

Development Criteria	Measurement	Notes
Property Size <i>Less than 10 acres with no possibility of adjacent assemblages</i> <i>Less than 10 acres with adjacent 10 acres or more</i>	Parcels that are smaller than 10 acres with no adjacent assemblages possible will be considered fatal flaw. If Parcels are greater than 10 acres or less than acres with possible assemblages, then they will move to Phase 2 Screening.	
Known Contaminated Sites <i>Tier 1 or Tier 2</i>	Identify/Rank potential for lengthy Environmental studies	Not Fatal Flaw but influencing factor in cost, clean up, development potential.
Environmental Issues and Natural Resources <i>Wetlands Mitigation Available or Not</i> <i>Floodplains</i> <i>Threatened and Endangered Species</i> <i>Category 1 Waters</i>	If wetlands exists assess potential development impacts . If small area likely can be still developed. If wetlands cover a high percentage of the specific parcel, then we would either deem a fatal flaw or may examine if there could be possible mitigation opportunities. Each parcel would then get a ranked based on it's wetland mitigation potential. If in floodplain review impacts and deem fatal flaw or rank on level of mitigation needed. Evaluate Potential for existence of threatened, rare, and endangered species If near Category 1 Waters review buffer needed and deem fatal flaw or rank on level of mitigation needed.	
Cultural Assets <i>Historic Properties</i> <i>Historic Bridges</i> <i>Historic Districts</i> <i>Historic Byways</i>	Develop a compatibility Index - not sure if this is necessary at this phase	Future development should be within the same context of any historic districts, etc. Development Conforms to Standard of Cultural Assets
Land Use & Zoning <i>Compatible Zoning</i> <i>Compatible Neighboring Zoning</i> <i>Compatible Use</i> <i>Compatible Neighboring Use</i>	Type of land ownership. Function and Pattern of Land Use. Parcel would not only get ranked on it's existing land use and zoning, but on it's proximity to sensitive community facilities.	Adjacent to sensitive community facilities (Churches, Schools, park, etc), E&J issues, Demographics

APPENDIX B

ECONOMIC INPUT-OUTPUT MODELS

THE BASIS OF IMPLAN

THE BASIS OF IMPLAN

The IMPLAN multi-regional models developed by the team are based on Input-Output (I-O) analysis. All I-O models share a common analytical framework. This appendix provides a technical overview of I-O, which was originally formulated by Leontief, winner of a Nobel Prize for this work, and continues today.

A. Depicting the Economy

I-O modeling focuses on the interrelationships among sectors in an economy. Within the I-O model, the economy of an area is mapped out in table form, with each industry listed across the top as a consuming sector (or market) and down the side as a producing sector. A column in the table or “matrix” depicts the inputs needed from every other industry to produce its output. **Table B.1** is known as an *inter-industry transactions matrix*.

	Agriculture	Manufacturing	Services	Other	Final Demand	Total Output
Agriculture	\$10	\$65	\$10	\$5	\$10	\$100
Manufacturing	\$40	\$25	\$35	\$75	\$25	\$200
Services	\$15	\$5	\$5	\$5	\$90	\$120
Other	\$15	\$10	\$50	\$50	\$100	\$225
Value Added	\$20	\$95	\$20	\$90		
Total Input	\$100	\$200	\$120	\$225		

Based on the example matrix developed for the 2000 *Regional Port Impact Model Handbook* by A. Strauss-Wieder, Inc. The numbers are hypothetical and shown in millions.

Each column shows the purchases made by a consuming industry from each of the producing industry sectors. Similarly, each row depicts the sales of a producing industry to all consuming industry sectors. For example, in Table B.1, agriculture, as a producing industry sector, sold \$65 million of goods to manufacturing. Conversely, the table depicts that the manufacturing sector of the economy as a consuming industry purchased \$65 million of goods from the agricultural sector.

An inter-industry matrix can be aggregated or quite detailed in terms of the sectors of the economy for which separate columns and rows are created. Research has found that detailed matrices tend to be more accurate; aggregated models can have as much as 50 percent error inherent in them. The IMPLAN model used for this assessment uses a highly disaggregated model.

IMPLAN's current 440-sector scheme is based on the US Bureau of Economic Analysis' (BEA) latest Benchmark Input-Output Study (I-O).¹ The current BEA Benchmark study used by IMPLAN for sector definitions is from 2002. Most of the IMPLAN sectors are based on NAICS codes up to the six-digit level, with some exceptions. As noted on the IMPLAN website, the Construction Sectors in IMPLAN are based on US Census structure types rather than NAICS codes, and some sectors within the model, as noted in the reference, are specialized to the IMPLAN model with their own definitions.

A *final demand* column is also included in **Table B.1**. This column, which is outside the square inter-industry matrix, includes imports, exports, government purchases, changes in inventory, private investment, and household purchases. The value added row, which is also outside the square inter-industry matrix, includes wages and salaries, profits, interest, depreciation, and indirect business taxes. Both the final demand column and the value added row equal the gross national product (assuming the table depicts the U.S. economy).

As previously noted, the final demand column includes household purchases and the value added row includes wages and salaries. By extracting household purchases from the final demand column into separate column in the inter-industry matrix and similarly, wages and salaries from the value added row into a separate row in this matrix, the *induced impacts* can be captured later in the multiplier calculations. The elements included in the multiplier – direct, indirect, and induced impacts were previously discussed in the main body of the report.

¹ https://implan.com/v4/index.php?option=com_multicategories&view=article&id=633:633&Itemid=71

The information in matrix depictions of economies (such as the example in **Table B.1**) is used to develop a *direct or technical requirements matrix*. An example of a technical requirements matrix is shown in **Table B.2**. Using the matrix in Table B.1 as a starting point, the numbers within each column are divided by the column total. For example, the cell for manufacturing's purchases from agriculture is $65/200 = 0.33$. Each cell in a consuming industry column in the direct requirements matrix shows how many cents of the *input* from a producing industry is necessary to produce one dollar of the consuming industry's *output* and are called *technical coefficients*. This is origin of the term "input-output."

Table B.2				
Direct or Technical Requirements Matrix				
	Agriculture	Manufacturing	Services	Other
Agriculture	0.10	0.33	0.08	0.02
Manufacturing	0.40	0.13	0.29	0.33
Services	0.15	0.03	0.04	0.02
Other	0.15	0.05	0.42	0.22

The resulting technical requirements matrix can then be mathematically used in a procedure called the *Leontief Inverse* to generate a matrix whose elements reflect the *total requirements, including the direct, indirect, and induced requirements*, needed to support the level of final demand shown in **Table B.3**. In mathematical terms, the Leontief inverse is represented by, with the "I" indicating the inversion of the "A" matrix depicted in Table B.2:

$$(I-A)^{-1}$$

The resultant matrix is called the *total requirements matrix*. The total requirements matrix resulting from the direct requirements matrix originally used in **Table B.2** is shown in its resulting total requirements form in **Table B.3**.

Table B.3				
Total Requirements Matrix				
	Agriculture	Manufacturing	Services	Other
Agriculture	1.5	0.6	0.4	0.3
Manufacturing	1.0	1.6	0.9	0.7
Services	0.3	0.1	1.2	0.1
Other	0.5	0.3	0.8	1.4
Industry Multipliers	3.3	2.6	3.3	2.5

As a way of explaining how the direct or technical requirements are transformed through the Leontief Inverse into the total requirements or impacts, note that the technical coefficient for the manufacturing sector's purchase from the agricultural sector was 0.33, indicating the 33 cents of agricultural products need to be directly purchased to produce a dollar's worth of manufacturing products. The same "cell" in **Table B.3** has a value of 0.6 which indicates that in order for the manufacturing sector to sell a dollar's worth of output, the agricultural sector must produce output worth 60 cents – 33 cents worth to be sold to the manufacturing sector and 27 cents worth to be sold to other sectors in the economy that will use it to produce materials and services that they will also need to sell to the manufacturing sector. The sum of each column in the total requirements matrix is the *multiplier* for that sector of the economy. The relationship between the total requirements matrix and final demand (which is the market for the products) is depicted mathematically as:

$$\begin{array}{rcccl}
 (I-A)^{-1} & \times & Y & = & X \\
 \\
 \text{Total Requirements} & \times & \text{Final} & = & \text{Total} \\
 \text{Matrix} & & \text{Demand} & & \text{Output}
 \end{array}$$

B. Changes in Investment and Economic Translators

The multipliers resulting from the creation of the total requirements matrix can be used to assess the economic impacts associated with changes in investment, such as an investment in the construction of expanded maritime terminals. This change in investment is considered, in I-O Analysis, a change in final demand and can be either positive or negative. (A negative investment is a situation where funds or an activity becomes lost to a region, for example, the loss of maritime-based commerce resulting from vessels being unable to enter the harbor because of inadequate channel depths.) Mathematically, this is depicted as:

$$(I-A)^{-1} \quad \times \quad \Delta Y \quad = \quad \Delta X$$

Total Requirements Matrix	x	Change in Final Demand	=	Change in Total Output
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A change in investment can be one-time, such as expenditures for labor and materials during construction. A change in investment can also be recurring, for example, the annual operation and maintenance expenditures associated with transit lines. One-time and recurring impacts are generally not mixed in either the analysis or reporting of economic impacts.

C. Advantages and Limitations of Input-Output Modeling

Advantages: Input-output modeling is among the most accepted means for assessing economic impacts, as previously indicated. The approach provides a concise and accurate means for articulating the interrelationships among industry sectors. The models can be quite detailed. As noted previously, the IMPLAN model used has 440 sectors. This level of detail provides a consistent and systematic approach, as well as a more accurate means for assessing the multiplier effects of changes in economic activity.

Input-output models also have the advantage of being about to be set up for specific regional economies and to capture the flows among geographical areas within a region. The multi-regional models (MRIOs) used in this assessment capture the flows among the various geographical areas as well as reflect the specific economies in each of the designated regions.

Limitations: I-O Analysis makes several key assumptions. First, the information used to create an input-output model is for *a given point in time*. The information in the model reflects a “snapshot” of the technical requirements and industry relationships at a given point in time. Because of this, input-output models are regularly updated. The US model is generally updated every five years. In general, more frequent updates are not necessary because overall industry requirements and relationships change at a slow pace.

In addition, input-output modeling assumes that there are no economies of scale to production in an industry; that is, the proportion of inputs used in an industry’s production process does not change regardless of the output level.

Further, regional input-output models generally assume that technical requirements and industry relationships are the same within the region as they are at the national level. That is, the type and proportion of inputs required to produce an industry’s output is the same as the national average. For an area as large and diverse as BEAs and states, this is a reasonable assumption. However, at a county or municipal level, the assumption can be less valid.

D. Regionalizing the Model – Regional Purchase Coefficients

Regional input-output models, such as the one used in this economic impact assessment, need to account for the percentage of the demand for an industry’s output or the requirements for a transportation project that can be readily supplied by firms within the specified region. Firms within the specified region may not be able to supply all the products needed. Therefore, goods and services may need to be purchased from outside of the specified region.

Demand that is met by firms with the specified region generates a multiplier effect within that area. Expenditures for goods produced outside the specified region “leak” a substantial portion of the multiplier effect to that other area. That is, the location where these goods are produced will benefit from the ripple effect of the expenditures. The greater the percentage of expenditures made within the specified region, the greater the multiplier effect to the area.

The IMPLAN Model uses *regional purchase coefficients* to account for these expenditure flows. A regional purchase coefficient (RPC) is defined as the proportion of the regional demand that can be expected to be supplied from producers within a given region. An RPC value of one indicates that all demand is met by firms in the specified region. Similarly, an RPC of zero indicates that none of the demand is met by firms in the region. Therefore, RPCs range in value

from zero to one. RPCs are applied to both the impact vector for an investment and to the Total Requirements Matrix so that expenditure streams that leak out of the area after the initial investment are accounted for. In mathematical terms, this is depicted as, with “R” representing the application of RPCs:

$$(I-RA)^{-1} \times R\Delta Y = \Delta X$$

Regionalized Total Requirements Matrix \times Regionalized Translator = Change in Regional Output

A variety of techniques are available to develop RPCs, including modified location-quotient, supply-demand, econometric analysis, and regional analysis. For this assessment, the default RPCs within IMPLAN have been used.

APPENDIX C

PROBLEM STATEMENTS

S. Main Street Bridge – Phillipsburg – MP 80.23

E. Hanover Avenue Bridge Catenary – Morris Plains – MP 31.48

Bridge Over Grand Avenue – Hackettstown – MP 58.00

Bridge Over Cattle Pass – Hackettstown – MP 57.49

Bridge Over Drain – Hackettstown – MP 57.25

Bridge over Shippenport Road – Roxbury – MP 44.97

Bridge Over Mill Brook – Denville – MP 36.41

Bridge Over Franklin Road – Denville – MP 35.28

NEW JERSEY DEPARTMENT OF TRANSPORTATION TRANSPORTATION PROBLEM STATEMENT FORM

S. Main Street Bridge – Phillipsburg – MP 80.23



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.
To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION	
Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: Norfolk Southern's Washington Secondary Line

Mileposts: 80.24 (railroad milepost)

Other Limits: South Main Street Bridge over rail line - Phillipsburg, NJ

Structure Number: N/A

County: Warren

Municipality: Town of Phillipsburg

Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical: Low bridge restricts clearance for rail car on the Washington Secondary Line
- Safety:
- Other:

Existing Bridge Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

This improvement is supportive of the goals of the Town of Phillipsburg's Ingersoll Rand Redevelopment Plan, June 2012.

ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA's Rail Freight Capacity and Needs Assessment to Year 2040, June 2013
- Town of Phillipsburg, Ingersoll Rand Redevelopment Study, June 2012

This project is supported by:

- Town of Phillipsburg, NJ
- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards

of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

**Thomas Wospil, Director
Capital Investment Planning and Development
New Jersey Department of Transportation
PO Box 600
Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or

supporting the proposed project

- As available, summary of any identified environmental issues within the probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

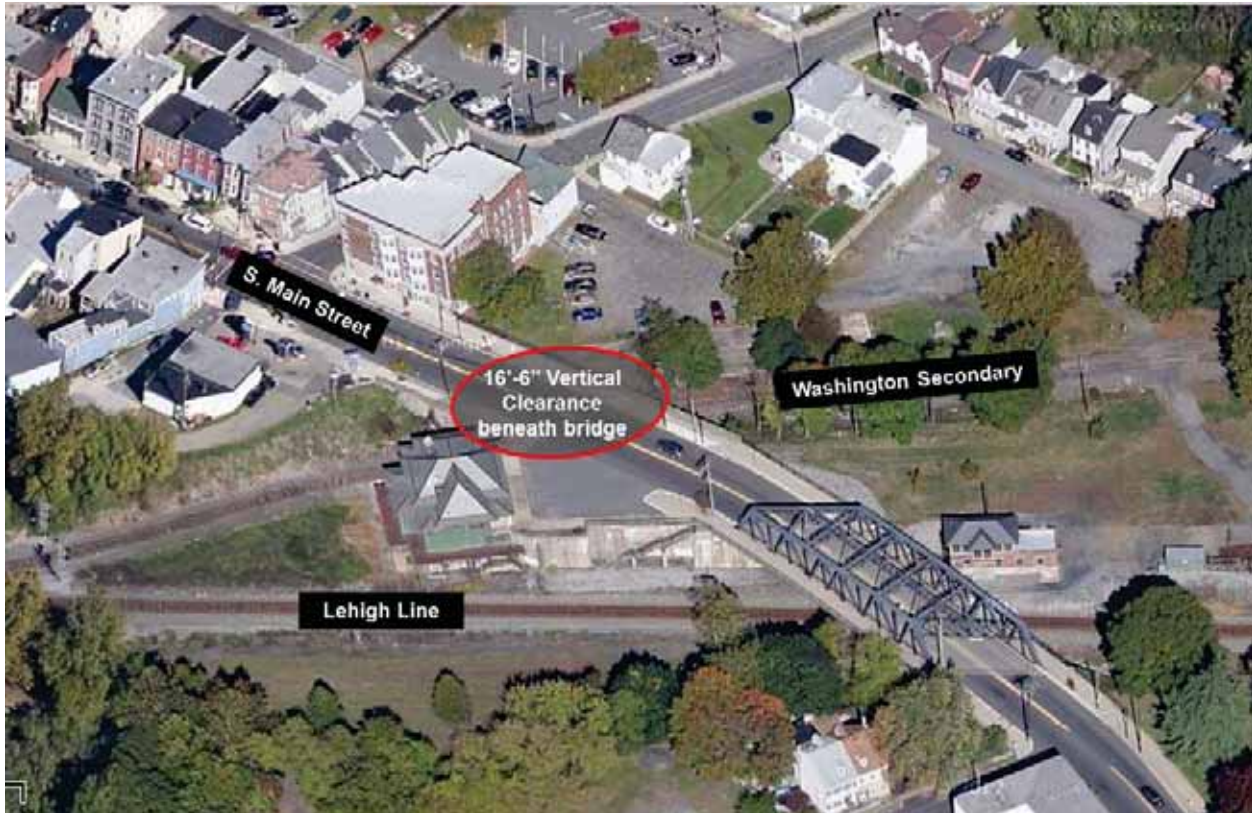
LOCATION: South Main Street Bridge over Norfolk Southern's Washington Secondary Line (railroad milepost 80.24)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: Norfolk Southern's Washington Secondary Line from the junction with the Lehigh Line (milepost 80.30) eastward to approximately Milepost 80.19.



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve

customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

South Main Street Bridge – Phillipsburg, NJ

The South Main Street Bridge over the Washington Secondary Line in Phillipsburg, NJ has a vertical clearance of 16'-6" from the top of rail to the bottom of the overhead bridge structure. This bridge was highlighted in the 2011 Morris County Infrastructure & Land Use Study as a vertical constraint that effectively controls the height of railcars that



can access the Washington Secondary. Elimination of this constraint would clear access for Plate "F" railcars along the Washington Secondary and the Morristown Line up to Morris Plains, and provide unconstrained Plate "F" access to the High Bridge Branch, Chester Branch, Dover & Rockaway Branch and the Montclair-Boonton Line (and by extension to the Totowa Branch). Another NJTPA study, *Rail Freight Capacity and Needs Assessment to Year 2040*, identified four (4) alternative improvement concepts to provide Plate "F" clearance at this location.

Alternative Concepts to Achieve Plate “F” Clearance at the South Main Street Bridge



Source: NJTPA Rail Freight Capacity and Needs Assessment to Year 2040

Concept 1 – Elevation of the South Main Street Bridge

Replacing the existing bridge with a higher bridge poses a number of challenges. The South Main Street Bridge is actually a compilation of two closely spaced structures – the bridge over the Washington Secondary and the steel truss bridge over the NS Lehigh Line¹. Modification (raising) of one bridge would likely necessitate modification of the other bridge to maintain safe vertical alignment for traffic along South Main Street.

South Main Street is closely abutted by active commercial and residential buildings as well as the historic former rail station which is the home of the New Jersey Transportation Heritage

¹ The NS Lehigh Line utilizes the NJ TRANSIT owned former CNJ line through this section of Phillipsburg..

Museum. The sidewalk/plaza serving the historic station is structurally integrated with the South Main Street Bridge structure. Modification of the bridge structure would require modification of the historic rail station structure as well.

Concept 2 - Undercutting (Lowering) the Track beneath the South Main Street Bridge

Undercutting of the track to lower the top of rail by approximately 12 inches would eliminate the need to elevate the bridge and potentially affect the historic properties abutting the bridge itself. A preliminary investigation of this option found that undercutting would allow the Washington Secondary to remain on its current alignment and would not affect the location of the existing switch controlling the junction of the Washington Secondary and the Lehigh Line.

While replacement of the bridge superstructure would be avoided with this approach, it is likely that reinforcement or modification of the bridge foundations would be required. Further, this area already experiences pooling water and difficulty with drainage during rain events. Undercutting the track would require drainage improvements for a length of track in the area of the bridge.

Concept 3 – Relocate Connection to the Washington Secondary Track – Low Speed Option

Replacing the existing junction with the Lehigh Line to a location east of the bridge would eliminate the need for trains to pass under the South Main Street Bridge. A new low speed connection would be constructed just east of the steel truss bridge over the Lehigh Line, with construction being predominantly constrained to municipally owned property. The relocated connection would introduce a more severe curve in the Washington Secondary east of the switch thus lowering the safe operating speed of the line. Further, the vertical grade of the line would increase. The alignment of the relocated track would come into close proximity with the remains of the historic roundhouse located east of the bridge.

On a positive note, the existing switch would be relocated from a curve on the Lehigh Line and placed on a tangent section. The section of the existing track that would be taken out of service could be removed or retained as a feature for use by the Transportation Heritage Museum, potentially for the storage and display of historic railcars.

Concept 4 - Relocate Connection to the Washington Secondary Track – High Speed Option

As with Concept 3, this concept contemplates replacement of the existing switch with a new switch east of the steel truss bridge. This concept would provide the same improvement to vertical clearance as Concept 3 but differs in that the new switch would be constructed as a high speed connection. Construction of this concept would require use of NJ TRANSIT owned property as opposed to primarily municipally owned property, but would likely avoid impacts to

the historic roundhouse.

Based upon the varied implementation challenges that each of these concepts would likely face, *Concept 2 - Undercutting (Lowering) the Track beneath the South Main Street Bridge* initially appears to be the most feasibly and least costly alternative. Based upon this preliminary evaluation, the construction cost, including the required drainage improvements is estimated to be in the range of \$1.0 to \$3.0 million. Additional engineering investigation would be required to identify details related to the undercutting, bridge foundation enhancement and drainage improvements and development of a more refined construction cost estimate.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013
- Town of Phillipsburg – Ingersoll Rand Redevelopment Study, June 2012

NEW JERSEY DEPARTMENT OF TRANSPORTATION TRANSPORTATION PROBLEM STATEMENT FORM

E. Hanover Avenue Bridge Catenary – Morris Plains – MP 31.48



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: NJ TRANSIT's Morristown Line
 Mileposts: 31.48 (railroad milepost)
 Other Limits: East Hanover Avenue Road Bridge - Morris Plains
 Structure Number: N/A
 County: Morris
 Municipality: Borough of Morris Plains
 Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical: Overhead catenary wires suspended under the bridge deck restrict vertical clearance
- Safety:
- Other:

Existing Bridge Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

This project is supported by:

- Borough of Morris Plains, NJ
- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

**Thomas Wospil, Director
Capital Investment Planning and Development
New Jersey Department of Transportation
PO Box 600
Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or supporting the proposed project
- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: East Hanover Avenue Road Bridge (railroad milepost 31.48)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: NJ TRANSIT's Morristown Line from the junction with Norfolk Southern's Washington Secondary Line eastward to approximately Milepost 31.48.



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

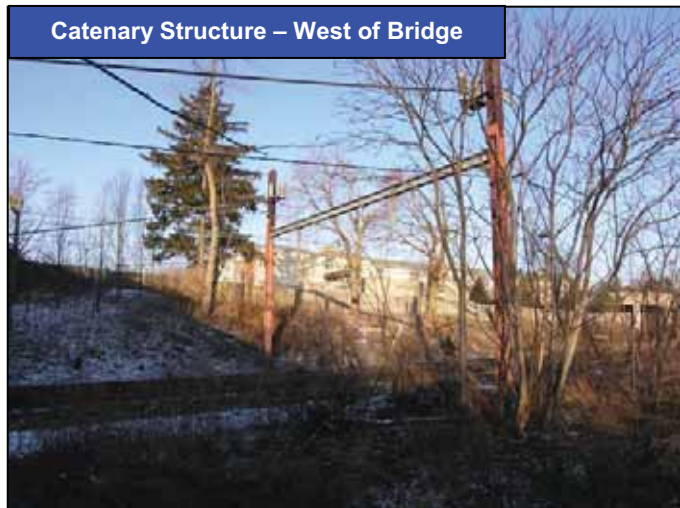
Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

East Hanover Avenue Bridge (MP 31.48)

Prior to its acquisition by NJ TRANSIT, the Morristown Line was owned and operated by the Erie Lackawanna Railroad. As was their standard practice, supports for catenary systems were mounted directly to the roadway bridges that crossed over the rail line. In the early 1990's, the East Hanover Avenue Bridge was replaced and raised, providing additional clearance for the Morristown Line which passes beneath the bridge. During



construction, new catenary portal support structures were installed on the western side of the bridge. The catenary was disconnected from the bridge itself and reconnected to the new supporting structures, but generally remained at its original elevation above the tracks beneath the bridge. While the vertical constraint exists beneath the bridge, it is the height of the catenary wires themselves that represent the vertical constraint to Plate "F" railcars, and not the actual bridge structure.



Through visual reconnaissance of the catenary system and consultation with representatives of NJ TRANSIT, it was determined that there may be adequate space between the wires and the bottom of the bridge itself to raise the wires to provide a minimum of 17 feet – 8 inches of clearance between the top of rail and the bottom of the catenary contact wire. However, this modification alone would not resolve the vertical clearance constraint in its entirety. Raising the wire beneath the bridge would require regrading of the catenary system to ensure continuous contact with the lower trolley wire.



Based on visual observations and discussions with NJ TRANSIT, it is anticipated that the catenary support structures and mountings on the west side of the bridge could be modified to accommodate regrading of the catenary line to provide the desired Plate “F” clearance beneath the bridge. However, the catenary support structures on the east side of the bridge were not replaced at the time the bridge was reconstructed. These structures were originally installed circa 1930 and can not be readily modified. They will require replacement to accommodate regrading of the catenary line. At this early planning stage, it is anticipated that a minimum of two, and possibly as many as four of the catenary support structures east of the bridge would require replacement to accommodate a higher catenary elevation.

While this preliminary improvement concept appears to be feasible, additional engineering investigation will be required to determine the limits of the required modifications and the number of catenary portal structures that would need to be replaced on the east side of the bridge. Assuming that three structures east of the bridge would require replacement, and that modification of the existing structures west of the bridge could be accomplished without replacement of the portal structures, the cost for changing the elevation of the catenary in this area to accommodate Plate “F” railcars is estimated to be in the range of \$1.0 to \$1.5 million.

As an alternative to raising the catenary, the tracks in this area would need to be undercut by a minimum of 6 inches to achieve the desired Plate “F” clearance in electrified territory of 17’-8”. A detailed engineering investigation would need to be conducted to determine if undercutting in this area is even feasible. Assuming that undercutting of the tracks would be feasible, it is estimated that the cost of undercutting to provide vertical clearance for Plate “F” railcars would be in the range of \$0.5 to \$1.0 million.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA's Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

NEW JERSEY DEPARTMENT OF TRANSPORTATION

TRANSPORTATION PROBLEM STATEMENT FORM

Bridge Over Grand Avenue – Hackettstown – MP 58.00



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: Junction of NS Washington Secondary and NJ TRANSIT's Morristown Line

Mileposts: 58.00 (railroad milepost)

Other Limits: Grand Avenue -- Hackettstown

Structure Number: N/A

County: Warren

Municipality: Town of Hackettstown

Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Existing Bridge Problem:

- Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

This project is supported by:

- Borough of Morris Plains, NJ
- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

**Thomas Wospil, Director
Capital Investment Planning and Development
New Jersey Department of Transportation
PO Box 600
Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or supporting the proposed project
- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: Grand Avenue (railroad milepost 58.00)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: Junction of NJ TRANSIT's Morristown Line and Norfolk Southern's Washington Secondary Line approximately Milepost 58.00



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these

businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Grand Avenue (MP 58.00) – Hackettstown

This bridge is located approximately 1 mile west of the Hackettstown station in the Town of Hackettstown. This bridge is also the location where NS jurisdictional control of the line ends and NJ TRANSIT jurisdiction begins.

This structure consists of a single span concrete bridge supported on stone abutments. Due to the overall deterioration, age and configuration of the structure replacement or strengthening of individual members is not considered practical or feasible. It is recommended that for improvements to this location to accommodate 286K railcars, the entire superstructure and supporting abutments be removed and replaced with a new bridge.

Recommendations / Cost

It is recommended that the entire bridge structure be replaced with a bridge type to be determined as part of a detailed engineering investigation. The likely cost for this improvement is estimated to be between \$2.0 and \$4.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to State Historic Preservation Office (SHPO) and other requirements.



SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

NEW JERSEY DEPARTMENT OF TRANSPORTATION TRANSPORTATION PROBLEM STATEMENT FORM

Bridge Over Cattle Pass – Hackettstown – MP 57.49



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: NS Washington Secondary

Mileposts: 57.49 (railroad milepost)

Other Limits: 0.25 miles west of NJ TRANSIT Hackettstown Station - Hackettstown

Structure Number: N/A

County: Warren

Municipality: Town of Hackettstown

Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Existing Bridge Problem:

- Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

This project is supported by:

- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

**Thomas Wospil, Director
Capital Investment Planning and Development
New Jersey Department of Transportation
PO Box 600
Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or supporting the proposed project
- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: Cattle Pass (railroad milepost 57.49)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: Norfolk Southern’s Washington Secondary Line from the junction with the Lehigh Line (milepost 80.30) eastward to approximately Milepost 57.49



DESCRIPTION OF THE PROBLEM

Norfolk Southern’s Washington Secondary Line and NJ TRANSIT’s Morristown Line (the “Corridor”) form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic

Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Cattle Pass (MP 57.49) - Hackettstown

This bridge, located approximately ¼ mile west of NJ TRANSIT's Hackettstown Station is a single span bridge with a concrete superstructure supported on stone abutments. This bridge originally provided access for livestock between the formerly active agricultural properties on both sides of the track. Visual inspection appears to indicate that there is no longer an agricultural use on either side of the track requiring maintenance of this bridge.

There are two primary options for improvements to this location to accommodate 286K railcars. Option 1 would be to remove the bridge and the underpass, filling this location with suitable materials and eliminating the concrete slab superstructure. However, it is important to note that this bridge is located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Removal of the bridge would require coordination with the SHPO.



Cattle Pass Bridge

As opposed to removal of the bridge, Option 2 would be to replace the existing concrete slab superstructure and abutments, replacing it with a precast concrete box structure. While this would still involve coordination with SHPO, it is likely that this alternative would result in fewer adverse effects on historic resources, would be more achievable and would involve less time and cost.

Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that Option 2 – Replacement of the bridge with a precast concrete box structure be advanced into engineering, design and implementation. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$1.5 and \$2.0 million. This cost estimate is a

preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

NEW JERSEY DEPARTMENT OF TRANSPORTATION TRANSPORTATION PROBLEM STATEMENT FORM

Bridge Over Drain – Hackettstown – MP 57.25



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: NS Washington Secondary

Mileposts: 57.25 (railroad milepost)

Other Limits: 500 yards west of NJ TRANSIT Hackettstown Station - Hackettstown

Structure Number: N/A

County: Warren

Municipality: Town of Hackettstown

Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Existing Bridge Problem:

- Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

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These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
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This project is supported by:

- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

**Thomas Wospil, Director
Capital Investment Planning and Development
New Jersey Department of Transportation
PO Box 600
Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

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Program Category:

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Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
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- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: Drain (railroad milepost 57.25)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: Norfolk Southern's Washington Secondary Line from the junction with the Lehigh Line (milepost 80.30) eastward to approximately Milepost 57.25



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Drain (MP 57.25) – Hackettstown

This bridge, located approximately 500 yards west of NJ TRANSIT’s Hackettstown Station, is a single span bridge with a concrete superstructure supported on concrete abutments. This bridge serves to accommodate a mix of drainage pipes and stormwater runoff conveyed from the south side to the north side of the tracks.



Similar to the Cattle Pass bridge at MP 57.49, this bridge is located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Removal of the bridge would require coordination with the SHPO. The recommended option for improvements to this location to accommodate 286K railcars is removal of the bridge, replacing the existing concrete slab superstructure and abutments with a precast concrete box structure.

Recommendation / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the replacement of the structure with a precast concrete box structure be advanced into engineering, design and implementation. It is proposed to remove the existing bridge and install a precast concrete box structure. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$1.5 and \$2.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic

prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA's Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

NEW JERSEY DEPARTMENT OF TRANSPORTATION TRANSPORTATION PROBLEM STATEMENT FORM

Bridge over Shippenport Road – Roxbury – MP 44.97



New Jersey Department of Transportation

Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews

Organization: North Jersey Transportation
Planning Authority

Phone/E-Mail: (973) 639-8404
tmatthews@njtpa.org

Name/ Phone/E-mail of Alternate: Jakub
Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: NJ TRANSIT Morristown Line

Mileposts: 44.97 (railroad milepost)

Other Limits: Shippenport Road - Roxbury

Structure Number: N/A

County: Morris

Municipality: Township of Roxbury

Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
 Operational:
 Physical:
 Safety:
 Other:

Existing Bridge Problem:

- Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service
 Operational:
 Physical:
 Safety:
 Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
 Possible Highway on New Alignment:
 Possible New Transit Line:
 Possible New Park & Ride Lot:
 Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

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ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

This project is supported by:

- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

**Thomas Wospil, Director
Capital Investment Planning and Development
New Jersey Department of Transportation
PO Box 600
Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or supporting the proposed project
- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: Shippenport Road (railroad milepost 44.97)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: NJ TRANSIT's Morristown Line from the junction with Norfolk Southern's Washington Secondary eastward to milepost 44.97



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic

Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Shippenport Road (Milepost 44.97)– Roxbury

This bridge, located in the Township of Roxbury, is a single span, open deck bridge where the railroad ties are directly supported on steel longitudinal beams (stringers). The stringers are supported on transverse floor beams, which are supported on steel through girders. According to the NJ TRANSIT bridge inspection reports, the stringers, floor beams and girders can safely carry 286K railcars. However, the bolts that connect the stringers to the floor beams are not adequate to handle 286K railcars.

This bridge is also located within the Delaware Lackawanna & Western Historic Corridor and as such is likely considered an historic bridge of cultural and architectural significance. Modification of the bridge would require coordination with SHPO. The recommended option for improvements to this location to accommodate 286K railcars is the removal of the bolts connecting the stringers to the floor beams and the associated connection angles and installation of new connection angles with additional, stronger grade bolts. It will be necessary to field drill holes in the stringers and floor beams for these bolts.



Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the bolts and connection angles be replaced with materials of a sufficient size and material grade to safely accommodate 286K railcars. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$1.0 and \$1.5 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

NEW JERSEY DEPARTMENT OF TRANSPORTATION

TRANSPORTATION PROBLEM STATEMENT FORM

Bridge Over Mill Brook – Denville – MP 36.41



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: NJ TRANSIT Morristown Line
 Mileposts: 36.41 (railroad milepost)
 Other Limits: Mill Brook - Denville
 Structure Number: N/A
 County: Morris
 Municipality: Town of Denville
 Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Existing Bridge Problem:

- Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

Constraint to the movement of 286K Plate "F" rail cars identified as a high priority issue requiring immediate action in the New Jersey Statewide Freight Rail Strategic Plan

Upgrading key rail corridors to accommodate 286K Plate "F" railcars is fully consistent with the goals and priorities set forth in the NJTPA's current Regional Transportation Plan ("Plan 2035"). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

This project is supported by:

- County of Warren Planning Department
- Morris County Planning Department
- North Jersey Transportation Planning Authority

Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

Send this completed form and support material to:

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New Jersey Department of Transportation
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Trenton, NJ 08625-0600**

FOR NJDOT USE ONLY

Assigned DB Number:

Legislative District:

Congressional District:

Program Category:

Information on the Form Has Been Verified by:

Attachment 1

Information required on all Transportation Problem Statements:

- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
- Statement of the extent to which the proposed capital improvement project or removal of the identified deficiency would advance the Department's objectives as identified in the Statewide Capital Investment Strategy
- Current traffic counts, accident data and/or other appropriate supplemental data, and associated analyses (e.g.; Highway Capacity Software analysis), as well as images (ground level or aerial) and/or mapping that further confirms the problem
- Identification of individuals or groups who may be sponsoring or supporting the proposed project
- As available, summary of any identified environmental issues within the

probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: Mill Brook (railroad milepost 36.41)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: NJ TRANSIT's Morristown Line from the junction with Norfolk Southern's Washington Secondary eastward to milepost 36.41



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Mill Brook (MP 36.41) – Town of Denville

This bridge, located in the Town of Denville, is a single span, but consists of two (2) different types of bridges. The original bridge on the northern side is a historic stone arch bridge. The original Mill Creek crossing was expanded to potentially accommodate four (4) tracks with the addition of a concrete slab superstructure supported on concrete abutments immediately adjacent to the original bridge. The original two tracks that crossed the stone arch bridge were relocated onto the new concrete slab bridge, with the tracks over the original arch section removed.

The recommended option for improvements to this location to accommodate 286K railcars is removal and replacement of the existing concrete slab portion of the bridge and strengthening the concrete abutments. It is anticipated that the entire bridge, both the original arch section and the newer concrete slab section will require replacement.

Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the concrete slab be replaced with structural enhancement of the concrete abutments as necessary to safely accommodate 286K railcars. Based on experience with similar undertakings and consultation with NJ TRANSIT, the cost for this improvement is estimated to be between \$2.5 and \$4.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.



These goals and objectives are directly in line with, and supportive of, New Jersey's Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one's physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA's Rail Freight Capacity and Needs Assessment to Year 2040, June 2013

NEW JERSEY DEPARTMENT OF TRANSPORTATION TRANSPORTATION PROBLEM STATEMENT FORM

Bridge Over Franklin Road – Denville – MP 35.28



New Jersey Department of Transportation Transportation Problem Statement Form

NOTE: To add text - click on gray box, then start typing.

To mark a check box - double-click, under Default Value click checked, then click OK

CONTACT INFORMATION

Name: Ted Matthews	Organization: North Jersey Transportation Planning Authority
Phone/E-Mail: (973) 639-8404 tmatthews@njtpa.org	Name/ Phone/E-mail of Alternate: Jakub Rowinski / (973) 639-8443 / jrowinski@njtpa.org

PROBLEM LOCATION & DESCRIPTION

Please provide applicable location information of the problem (if field doesn't apply, type N/A):

Route: NJ TRANSIT Morristown Line
 Mileposts: 35.28 (railroad milepost)
 Other Limits: Franklin Road - Denville
 Structure Number: N/A
 County: Morris
 Municipality: Town of Denville
 Other:

Please check those items that best categorizes the problem, along with a detailed description:

Existing Highway Problem:

- Capacity:
- Operational:
- Physical:
- Safety:
- Other:

Existing Bridge Problem:

- Capacity: Bridge is not structurally sufficient to accommodate 286K railcar service
- Operational:
- Physical:
- Safety:
- Other:

Sub-corridor/Corridor/Sub-regional/Regional Problem:

- Need for Corridor Study:
- Possible Highway on New Alignment:
- Possible New Transit Line:
- Possible New Park & Ride Lot:
- Other:

NJDOT GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Check all the goals contained in New Jersey's Long Range Plan (Transportation Choices 2030) that apply to your problem location

- Maintain and Renew Transportation Infrastructure
- Integrate Transportation and Land Use Planning
- Increase Safety and Security
- Improve Mobility, Accessibility, Reliability
- Respect the Environment
- Optimize Freight Movement
- Operate Efficiently
- Continue To Improve Agency Effectiveness

Provide any additional information here that details how mitigating the problem meets the goal(s)

This constraint to industry standard freight rail activity impedes operation of existing businesses served by the rail line and hinders the attraction of new industrial development activity in Warren and Morris Counties

OTHER GOALS APPLICABLE TO YOUR PROBLEM LOCATION

Please provide additional information that details how mitigating this problem location meets **OTHER** goals and objectives, as contained in, but not limited to: Regional Long Range Transportation Plans; Regional Capital Investment Strategies; Regional Strategy Evaluation; Sub-region, Corridor or Sub-corridor Plans, etc.:

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ASSET MANAGEMENT (PERFORMANCE MEASURES AND TARGETS)

Please provide a detailed description of the key performance measures and targets applicable to the problem location that will track success in obtaining the vision and goals and objectives of the aforementioned plans:

Success of the investment may be tracked in relation to the increase in freight rail activity (annual revenue moves, customers served, etc) along the Washington Secondary/NJ TRANSIT Morristown Line Corridor

PROBLEM LOCATION PRIORITY

Please provide a detailed description of the priority of this problem location, including a ranking or scoring relative to all other similar problem locations:

Problem location and nature is unique and cannot be readily compared with comparable problem locations

MISC

Please provide any additional information pertinent to the problem location not covered by the above (see Attachment 1, next page, for guidance):

This issue was identified and addressed at a conceptual level in three (3) recent studies including:

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Signature of Initiator: _____

Date of Signature: _____

Please attach the appropriate support documentation, such as, but not limited to: Resolutions of Support; approved documents from decision-making groups such as Executive Committees or Boards of Trustees; approved documents from other official decision-making bodies; etc.

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Attachment 1

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- Concise statement of need
- Proposed concept and/or range of strategies to address the identified need, as appropriate
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probable footprint of the proposed project, especially including the identification of any historic or potentially historic properties, historic or potentially historic structures, historic districts, and wetlands.

NOTE: Capital Investment Planning and Development will return a Transportation Problem Statement to the initiator if it is deemed incomplete.

New Jersey Department of Transportation Transportation Problem Statement Attachment – Description of the Problem

LOCATION: Franklin Road (railroad milepost 35.28)

Route (if applicable): N/A

Mileposts (if applicable): N/A

Structure number (if applicable): N/A

Limits: NJ TRANSIT's Morristown Line from the junction with Norfolk Southern's Washington Secondary eastward to milepost 35.28



DESCRIPTION OF THE PROBLEM

Norfolk Southern's Washington Secondary Line and NJ TRANSIT's Morristown Line (the "Corridor") form the spine of the rail network serving Warren and Morris Counties. In addition to serving businesses and industries located directly adjacent to this corridor, the line provides freight rail access to four (4) branch lines that serve additional businesses in Morris and Passaic Counties. A series of vertical clearance constraints (overhead structures and catenary lines) and

weight restricted bridges limit the size and loading of the rail cars that can be used to serve customers along the Corridor and connecting branch lines. These limitations place these businesses at a competitive disadvantage and limit the ability of the region to attract new rail-served industrial businesses.

Vertical clearances along the corridor prevent the movement of Plate "F" rail cars, a typical standard rail car used throughout the industry having a maximum height above top of rail of 17'-0". A minimum clearance of 17'-6" between the top of rail and the bottom of the overhead structure is required for the safe movement of Plate "F" rail cars. Along electrified sections, a minimum of 17'-8" between the top of rail and the low point of the overhead catenary wires is required to prevent electrical arcing and allow the safe movement of Plate "F" rail cars.

A number of structurally deficient bridges limit the weight that can be carried resulting in the short-loading of many of the rail cars that serve the businesses along the Corridor. Currently, loading of rail cars moved along the Corridor is limited to 263,000 pounds ("263K") per rail car. Since 1995, the Association of American Railroads ("AAR") has maintained a national standard allowing loading of up to 286,000 pounds ("286K") per rail car.

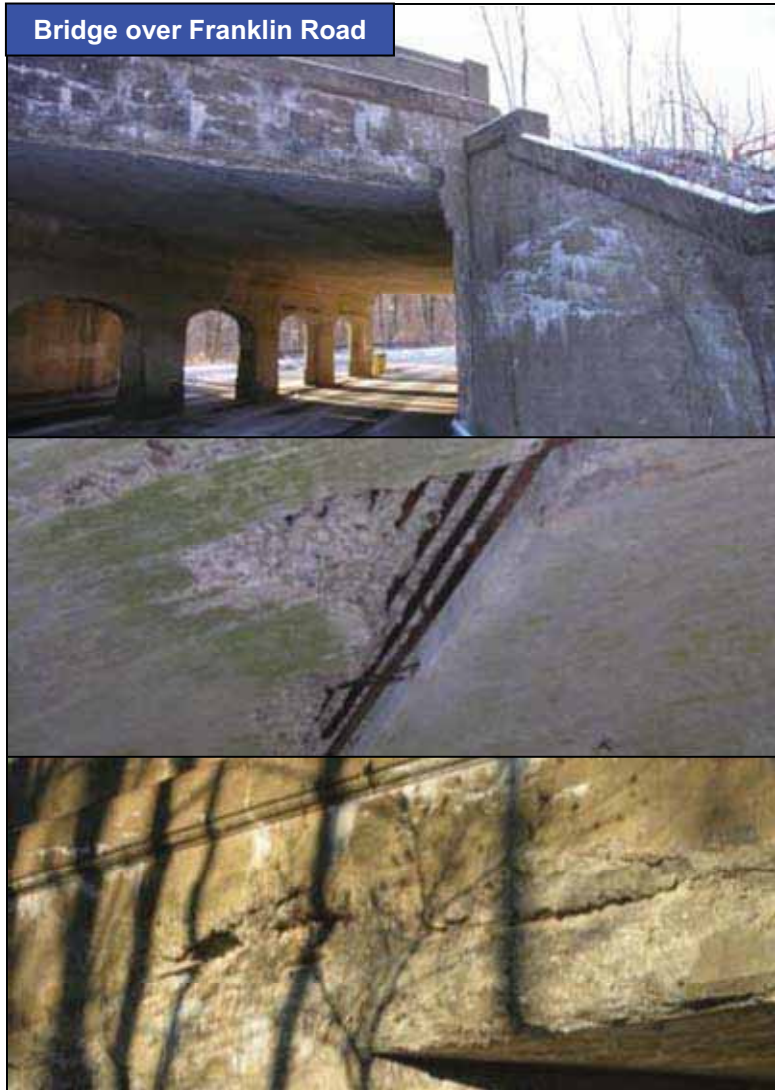
Twenty one (21) businesses located along the Corridor and the connecting branch lines rely on rail freight to receive commodities, ship finished products and compete in a global economy. Additional active businesses located along the rail lines used to but no longer receive rail shipments because constraints to the rail system adversely impact their ability to economically receive these shipments directly by rail. The vertical and weight constraints that characterize the Corridor minimize the competitive advantage of existing rail served industries, limiting the ability to retain existing and attract new rail served industries to the region.

Further, there exist a number of inactive industrial sites along the corridor, some of which were formerly rail-served. These and other vacant and underutilized industrial properties could once again be made attractive locations for rail-oriented businesses. Improvements to the corridor and the rail service that can be provided would serve as a catalyst to retain and grow existing rail served businesses, as well as attract new industrial development / redevelopment, bringing jobs and economic vitality to the region.

Franklin Road (MP 35.28) – Town of Denville

This bridge, located in the Town of Denville, is a two span concrete bridge. Due to the significant deterioration of the superstructure and concrete abutments noted in the NJ TRANSIT bridge inspection reports and observed during the field inspections, replacement or strengthening of individual members is not considered practical or feasible.

It is recommended that for improvements to this location to accommodate 286K railcars, the entire superstructure and supporting abutments be removed and replaced with a new bridge. This location presents some challenges to the actual construction due to the skewed angle of the bridge crossing Franklin Road, as well as the width of the existing bridge and the need to maintain passenger rail service during the period of construction.



Recommendations / Cost

While further engineering investigation will be required to fully define the scope of the improvement necessary, it is recommended that the entire bridge structure be replaced with a bridge type to be determined as part of a detailed engineering investigation. Due to the construction challenge that replacement of this bridge presents and in consultation with NJ TRANSIT the cost for this improvement is estimated to be between \$8.0 and \$12.0 million. This cost estimate is a preliminary order-of-magnitude estimate only, and is not based upon detailed engineering. Additional costs may be incurred due to SHPO and other requirements.

SUPPORT FOR REGIONAL AND STATEWIDE TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

Upgrading key rail corridors to accommodate 286K Plate “F” railcars is fully consistent with the goals and priorities set forth in the NJTPA’s current Regional Transportation Plan (“Plan 2035”). Plan 2035 supports investments in the rail infrastructure that increase weight capacity from 263K to 286K cars, and eliminate overhead height restrictions throughout the NJTPA region.

These goals and objectives are directly in line with, and supportive of, New Jersey’s Draft State Strategic Plan (successor to the State Development and Redevelopment Plan). The State Strategic Plan presents a blueprint for achieving sustainable economic growth; economic prosperity properly balanced with natural resource preservation; and personal satisfaction with one’s physical surroundings.

ADDITIONAL STUDIES

This issue was identified and addressed at a conceptual level in two (2) past studies including:

- Morris County Freight Infrastructure & Land Use Analysis, July 2011
- NJTPA’s Rail Freight Capacity and Needs Assessment to Year 2040, June 2013