Central New Jersey
Raritan Valley
Transit Study

Feasibility Analysis Report

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Submitted by:

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1. INTRODUCTION

1.1 Purpose and Need

The Central New Jersey/Raritan Valley Transit Study (Study) identified and assessed actions along the Interstate-78 (I-78) Corridor in portions of central and western New Jersey to enhance bus and passenger rail service. The Study analyzed a broad range of bus and commuter rail alternatives and facilities to identify a set of feasible and effective transportation solutions that would improve and complement existing and planned transit services, and improve patron access to those services. A comprehensive set of short, medium and long-term actions, ranging from new transit services to improvements and programs supporting efficient movement, were developed to address present and forecast future congestion problems. The Study was guided by a statement of Purpose and Need and the determination of goals and objectives. These items can be found in **Appendix A** and are further described in Sections 1.5 and 1.6. The Study produced basic factual information about a range of potential alternatives so that decision-makers can be informed about the relative value of various transit improvements and their benefits to the corridor.

1.1.1 Recent Changes since Technical Work was Prepared in this Study

Rail ridership for the Study was forecast using NJ TRANSIT's 2030 operating plan, which assumed implementation of the Access to the Region's Core (ARC) project. With the recent cancellation of ARC, NJ TRANSIT's 2030 operating plan will need to be updated, which will also change the operating plan and ridership forecast for this Study. This report is being issued as a draft pending completion of these additional analyses.

1.2 Study Area

The Study Area is shown on **Figure 1**. The western limit of the study area was the Delaware River, and the eastern limit was the Raritan Valley Line station in Bridgewater, New Jersey. The Study Area included portions of Hunterdon, Warren and Somerset counties. Pennsylvania's Lehigh Valley (Northampton and Lehigh Counties), although not included in the formal Study Area, also contributed transit ridership.

1.3 Existing Highways, Transit Services, Park-and-Rides

There are three principal roads experiencing heavy peak period congestion in the Study Area. I-78 operates east-west, connecting central Pennsylvania with New York City via the Holland Tunnel. U.S. Route 22 runs concurrent with I-78 between Phillipsburg and Annandale. Route 22 proceeds southeast from I-78 to Bridgewater and Bound Brook, at the eastern edge of the study area. In Clinton, at the geographic center of the study area, State Route 31 intersects with I-78, operating north-to-south between U.S. Route 206 in Mercer County (Trenton) and U.S. Route 46 in Warren County (White Twp).

Study Area rail stations are located at High Bridge, Annandale, Lebanon, and Whitehouse on the Raritan Valley Line (RVL), and at Hackettstown on the Morris and Essex Line (M&E). RVL service further west to Phillipsburg, including a station in Glen Gardner, was discontinued in 1983. NJ TRANSIT and the HART, Ridewise and TransOptions Transportation Management Associations (TMAs) offer community and employer shuttles as described in **Appendix G.** Private bus operators including TransBridge and Bieber operate long distance bus service between the Study Area and principal New York area commuter bus destinations in the Urban Core[1](defined in footnote below).

[1] The Urban Core is defined as the employment center of New York and Northern New Jersey that is accessible by transit. This includes Newark, Jersey City, much of Hudson County, and Lower and Midtown Manhattan.

1.4 Project History

In 2007, the North Jersey Transportation Planning Authority (NJTPA) conducted the *I-78 Corridor Transit Study* which evaluated current transit services and facilities as well as future traffic conditions in the I-78 corridor in Lehigh and Northampton Counties, Pennsylvania and Somerset, Hunterdon and Warren Counties, New Jersey. The I-78 study identified potential transit improvement strategies such as improved bus and rail service, preferential bus treatments on highways and arterials, and new and expanded park-and-ride facilities that could relieve forecasted I-78 traffic congestion.

The I-78 study recommended a series of improvements and expansions to public transit systems serving the corridor including public and private bus line-haul operations, passenger rail service extensions, expanded bus service along I-78, U.S. Route 22 and N.J. Route 31, and shuttle bus services at key rail stations and activity centers. The I-78 study also made an initial assessment of a possible extension of the Raritan Valley Line between High Bridge and Phillipsburg, New Jersey. Pertinent results from the I-78 Corridor Transit Study can be found in **Appendix B**.

1.5 Transportation Problems and Needs

Many travelers originate in Pennsylvania, Warren and Hunterdon Counties and use I-78 and Route 22 to access destinations in central Hunterdon and along Route 22. Additionally, travel to the Urban Core (see footnote) relies heavily on I-78.

The Study Area has experienced growth in population and employment. Current Study Area forecasts predict that future growth will not be significant due to local land use restrictions and open space preservation. In addition, state-level development restrictions imposed by the Highlands Act, which covers most of the Study Area, strengthens local anti-growth restrictions. However, significant residential growth has occurred recently in Pennsylvania's Lehigh Valley and further growth is forecasted to continue through 2030. This growth is expected to increase commuter volumes along the I-78 corridor in New Jersey and will induce a need for additional transportation alternatives.

Extensive and frequent congestion on I-78 and Route 22 is expected to worsen over the years. Local streets will also be affected as traffic diverts from the congested primary system. More adverse impacts to the quality of life in the corridor will occur without the implementation of additional travel choices. Traffic flows in 2030 will be severely impacted without improvements, as noted the Appendices. In fact, general traffic flow on sections of I-78 will be below 35 mph during peak hours.

NJ TRANSIT rail service extends only into eastern portions of the study area, and access to existing rail stations from western parts of the study area requires that patrons travel along I-78 through the congested segments between Clinton and Phillipsburg. This market is underserved by existing bus service as well, as most bus park-and-ride facilities fill up early each weekday.

1.6 Project Goals and Objectives

Goals and objectives were developed in collaboration with the Study's Technical Advisory and Community Liaison Committees. Public involvement and the committee structures are described in Section 2. Goals and objectives fall within three categories: transportation, environmental/community, and financial. The goals and objectives are as follows:

TRANSPORTATION:

- Improve mobility within the study area
- Reduce the growth of peak period traffic congestion along I-78 and other key roadways (US-22, Rte. 31)
- Improve multi-modal regional transit within the CNJ/RV corridor
- Improve the image of mass transit as an attractive and viable form of transportation through the study area
- Increase transit ridership
- Improve work commute options for residents
- Connect important work destinations and major employers with new transit services and connections to transit routes and systems
- Reduce travel time
- Improve the connectivity of existing transit services in the region and make better use of existing transportation facilities
- Provide the ability for phased implementation, as well as projects with short-term implementation

ENVIRONMENTAL/COMMUNITY:

- Minimize environmental impacts to the preexisting, natural environment
- Implement transit improvements so that community impacts are minimized
- Support local economic development plans
- Encourage more transit-friendly communities with mixed-use pedestrian-friendly transit station areas, where desired

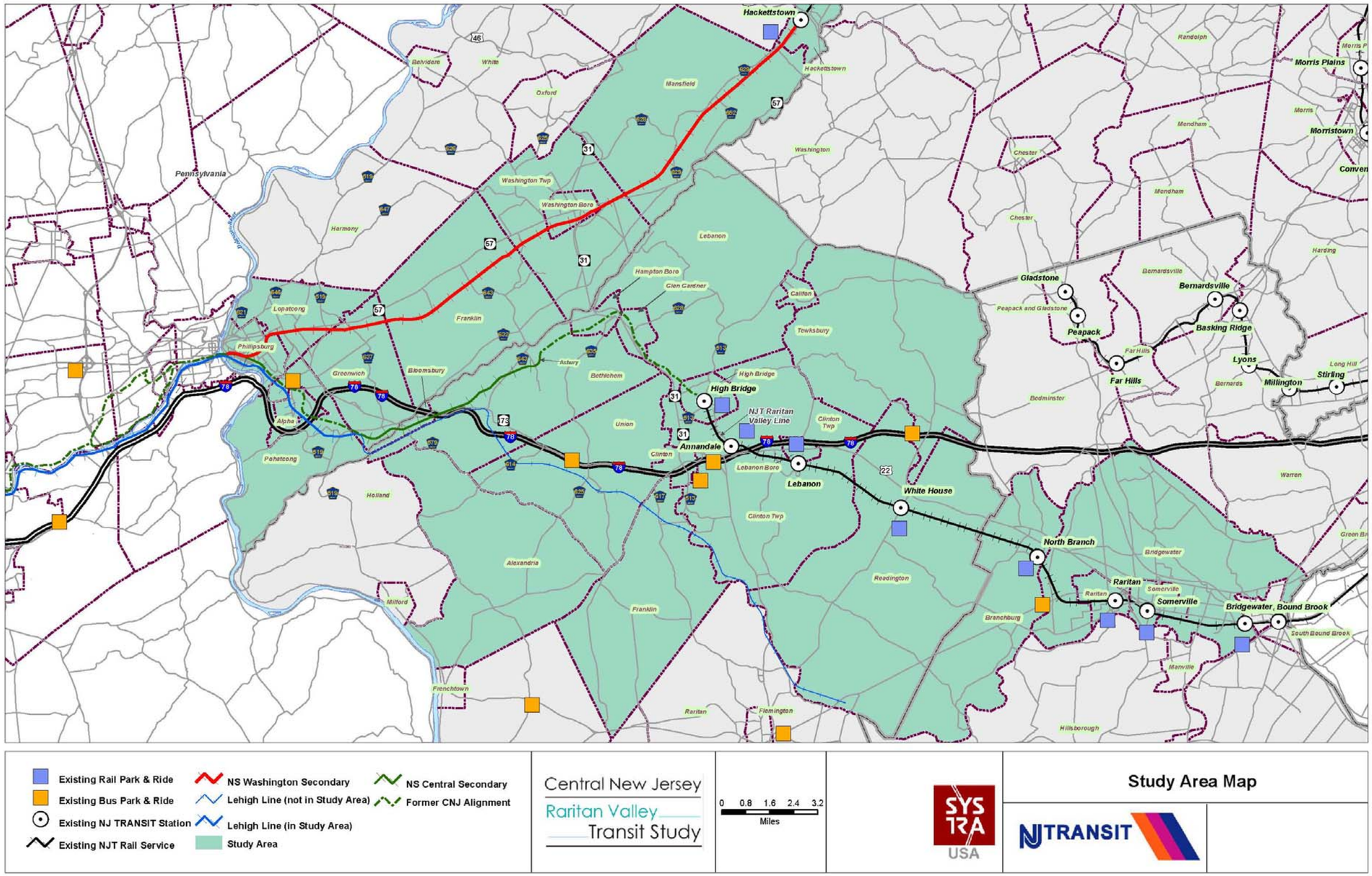
FINANCIAL:

- Develop cost effective alternatives
- Increase overall transit revenues
- Invest financial resources efficiently and effectively

1.7 Planning Context

This study was sponsored by a grant from the Federal Transit Administration (FTA). The FTA planning and project development process, in which federal, state and local officials plan and make decisions regarding major transit capital investments, contains five phases: 1) System Planning, 2) Alternatives Analysis (AA), 3) Preliminary Engineering (PE)/Environmental Impact Statement/Environmental Assessment (EIS/EA), 4) Final Design and 5) Construction. This study is a Feasibility Analysis of transit alternatives identified to address the Purpose and Needs and Goals and Objectives of the Study, and was conducted to determine feasibility and costs for this wide range of alternatives.

Figure 1: Study Are



2. PUBLIC INVOLVEMENT

2.1 Introduction

The primary goal of the public involvement process was to engage a diverse group of public and agency participants to solicit relevant input throughout the Study. The process included regular meetings and workshops with the various stakeholders to explain and present process and findings, gain public input, and inform the public.

The first step of the public outreach process was to work with local representatives in the study area to review preliminary study materials and to identify issues, questions and concerns related to commuting and the availability of transit to their residents. A series of workshops were held in February 2008 to solicit input which guided the alternative development process. Technical Advisory Committee (TAC) and Community Liaison Committee (CLC) meetings were held throughout the study. The TAC was comprised of technical agency representatives and the CLC included local elected officials, local agencies, and business groups. A list of TAC/CLC members, meeting dates, and attendees can be found in **Appendix C.** Meeting notes, agendas and presentations from all meetings and workshops can also be found in **Appendix C**.

2.2 Summary of Local Concerns

- Many communities support development restrictions such as the Highlands Act.
- Most communities which host the rail alignments under consideration support the reactivation of passenger rail service.
- The lack of bus park-and-ride facilities has been acknowledged and communities are generally willing to consider improvements including new rail stations and bus park-and-rides. However, the protection of residential neighborhoods and local traffic circulation are foremost concerns, and regional traffic should not mix with local circulation routes. The protection of environmental resources is also of particular concern to some communities.
- Municipalities hosting park and rides with a large catchment area to the west prefer that new park-and-rides be sited to the west to attract travelers at an earlier point in their trip, freeing current park-ride space for local residents.
- Towns with residential neighborhoods within walking distance of potential station sites are interested in hosting rail stations that would capture that market. These towns include Hampton, Bloomsbury and Phillipsburg.
- There is interest in extending transit service, particularly rail service, to the Lehigh Valley. In response, a study of improved transit services between New Jersey and Allentown, Pennsylvania was prepared under the direction of the Lehigh Valley Economic Development Commission, and the Counties of Northampton and Lehigh. This study is available at the Lehigh Valley Planning Commission.
- Meetings with Clinton Township officials toward the end of the Study revealed their opposition to the Round Valley Bus/Rail park-and-ride site. The Round Valley site presented in this report and analyzed in the Short List, is not preferred locally due primarily to forecasted traffic congestion on Route 22. Future analysis will require identification of traffic mitigation strategies, along with further review of alternate potential sites in this area.

3. ALTERNATIVES CONSIDERED

A Long List of 51 alternatives was identified from sources including transit improvements identified in the I-78 Transit Study, the municipal workshops held in February 2008, and the initial TAC meeting held in April 2008. Rail services in the Long List were the extensions of the NJ TRANSIT Morris and Essex Line (M&E) from Hackettstown to Phillipsburg, and the Raritan Valley Line (RVL) from High Bridge to Phillipsburg. Bus services in the Long List include additional service to the Urban Core (See footnote 1) and to the Bridgewater/Somerville/Raritan area, where many work trips are located from the Study Area are destined. Rail services included in the Long List were the extensions of the NJ TRANSIT Morris and Essex Line (M&E) from Hackettstown to Phillipsburg, and the Raritan Valley Line (RVL) from High Bridge to Phillipsburg. Each Long List Alternative was assigned a name and number. All ideas were considered as shown in Table 1. Alternatives were grouped into the following categories, in the general order of implementation timeframe:

- Bus Services
- Existing Rail Station Improvements
- Park-and-Rides, in four geographic areas:
    - Confluence of I-78/Rt. 31/ Rt. 22
    - Route 31 Corridor
    - Bloomsbury Area
    - Phillipsburg/Alpha Area
- Rail Extensions
- Stations along Rail Extensions
- Other

There are certain dependencies across these categories. For example, implementation of new bus services is dependent on developing new park-and-ride capacity for commuters. Proposed rail stations were to the extent possible located so that they could be first developed as bus park-and-rides. The complexity of implementation was determined to be of importance and an implementation timeframe was associated with each alternative. Short-term alternatives that might be implemented in under five years were given an “S” (Short) number. “S” alternatives had low capital costs, no environmental permitting requirements, and no property acquisition requirements. Medium-term alternatives had significant capital costs, environmental clearance processes, and/or property acquisition requirements, and were given an “M” (Medium) number. Long-term improvements were major systems improvements such as rail line extensions, multi-year capital funding requirements, lengthy environmental studies (typically an EIS) and property acquisition needs and were given and “L” (Long) number. The list of alternatives grouped by mode and function (service or park-and-ride/station) can be found in the Long List Development and Screening Results Report in **Appendix D**.

3.1 Long List Screening Methodology

The Long List screening methodology included a qualitative analysis that assessed how well each alternative addressed study goals and objectives. Long List alternatives were screened first to an Intermediate and then to a Short List. The most significant criteria were property acquisition requirements, preliminary environmental scan results, and the stakeholder/public review processes. Qualitative cost assessments were based on potential construction scope and engineering complexity, and preliminary qualitative ridership assessments.

In an Intermediate step quantitative ridership estimates for the year 2030 were prepared by NJ TRANSIT using the North Jersey Transit Demand Forecasting Model. Services and station and park-and-ride sites that were shortlist to the Intermediate List but then had low ridership forecasts were screened out.

3.2 Intermediate Ridership Forecasting

Bus service in the Route 31 Corridor to the Urban Core (see footnote 1) and to the Bridgewater area via I-78 was eliminated due to low forecasted ridership. Bus park-and-ride alternatives in the Route 31 Corridor were therefore eliminated as well. Additional bus service on I-78 to the Urban Core was shortlist, along with a preferred park-and-ride site in each geographical area.

Ridership estimation revealed that Bloomsbury Area park-and-rides would attract riders that would also use Phillipsburg/Alpha park-and-rides, with the exception of the Phillipsburg Rail Station catchment area. These two geographical areas were essentially merged in developing the catchment area for Bloomsbury Area park-and-rides.

Rail ridership was based on a year 2030 commuter rail system operating plan, and with the Access to the Region's Core project completed. This project will provide a one-seat ride to Midtown Manhattan on the Raritan Valley Line. All trains now proposed to operate to and from High Bridge on the RVL or Hackettstown on the M&E would be extended to the proposed extension terminal.

Rail service via the M&E had lower ridership projections than service via the RVL due to longer travel times east of the current rail termini, and lower current and potential service frequencies, due to infrastructure constraints east of current rail termini.

Rail shuttles, which were identified as a rail service complementary strategy, were analyzed at Whitehouse, Raritan and Somerville Stations. Ridership potential compared to operating costs was best at Raritan, and was therefore assumed to be part of each rail service alternative. While rail shuttles traditionally do not generate enough ridership to warrant traditional bus service, further development of routes (with TMA and employer participation) could be investigated, under the conditions of a continued High Bridge RVL terminal as well as with any of the shortlist extensions.

Six bus/rail park-and-ride locations were considered in the ridership forecasting effort. These were divided into three separate groups, a western cluster consisting of facilities in Alpha, Greenwich and Bloomsbury as mentioned above, an eastern cluster in Union and sites in Clinton Township (Listed as at the Confluence of I-78, Rt. 22 and Rt. 31) and a northern cluster located on the Rt. 31 corridor. Within each cluster, ridership to each site was comparable, and so one site

(typically the most preferred site due to other considerations) was used in the ridership estimation. For full ridership information, see **Appendix F**.

The results of the Long List to Intermediate List to Short List screening are documented in **Table 1.** Detailed Long List to Intermediate List screening results can be found in the *Long List Development and Screening Results Report* in **Appendix D**.

Table 1: Long List Alternatives Screening Results

Alt #	Long List Alternative Name	Screening Result
BUS SERVICES		
S06	**More Midday Bus Service – Bieber and TransBridge I-78 Routes to the Urban Core**	DROPPED - Excessive operating costs and vehicle storage/positioning issues (PM peak buses could not cycle back for revenue service)
S09	**Hackettstown to Trenton Bus Service**	DROPPED - No demand, excessive costs, slow speed, high fares
S10	**Glen Gardner Rt. 31Bus Service to Urban Core**	DROPPED - Same service provided by S14 – combined with S14
S13	**Express Bus Service in the I-78 and US Route 22 Corridor from Washington Borough to Bridgewater Area**	DROPPED - Shortlist to Intermediate Stage, then dropped due to low ridership
S14	**Express Bus Service in the NJ Route 31 Corridor and US Route 22 Corridor from Washington Borough to Bridgewater Area**	DROPPED - Shortlist to Intermediate Stage, then dropped due to low ridership
S29	***Additional Express Bus Service in the I-78 Corridor to Urban Core (Midtown/ Lower Manhattan/ Exchange Place)***	***SHORTLIST (see Section3.3)***
S30	**Express Bus Service in the NJ Route 31 Corridor to Urban Core** (Midtown/ Lower Manhattan/ Exchange Place)	DROPPED - Shortlist to Intermediate Stage, then dropped due to low ridership
M03	**Conversion of Inactive Rail ROW's to Busways - NJ**	DROPPED - Inactive ROW's available for conversion to busways are not located near congested segments of I-78, Rt. 22 or Rt. 31; no value in reducing roadway congestion

Alt #	Long List Alternative Name	Screening Result
EXISTING RAIL STATION IMPROVEMENTS ALTERNATIVES		
S22	**White House Station - RVL – Expand Parking on Speranza Brick Property**	DROPPED - Does not improve I-78 congestion (a)
S23	**White House Station - RVL – Use Main Street Lot for Commuter Parking**	DROPPED - Does not improve I-78 congestion (a)
S24	**White House Station - RVL – Share Doctor's Office/Sandwich Shop Parking for Commuter Use**	DROPPED - Does not improve I-78 congestion (a)
S26	***Annandale Station RVL – Expansion on NJT ROW and Vacant Parcel (in possible second phase)***	***SHORTLIST (see Section 3.3)***
S27	**North Branch Station RVL - Use Existing Print Making Council Lot**	DROPPED - Does not improve I-78 congestion (a)
S28	**Raritan Station RVL - Permit-only Lot Expansion**	DROPPED - Does not improve I-78 congestion (a)
M15	**Relocate Hackettstown Station – M&E - Bergen Tool Site**	DROPPED - Platform and parking would need to be relocated (b)
M16	**Relocate Hackettstown Station - M&E - Ford Site**	DROPPED - Platform and parking would need to be relocated (b)
M17	**High Bridge Rail Station – RVL - Add Parking on Railroad ROW**	DROPPED - Civil work would be costly and would yield few spaces; residences are too close; impacts to potentially historic retaining wall

(a) Parking expansion could be pursued to meet local needs.
(b)Transit Oriented Development opportunity – recommendation will be made for town to pursue outside this study.

Alt #	Long List Alternative Name	Screening Result
EXISTING RAIL STATION IMPROVEMENTS ALTERNATIVES (Continued)		
M19	***High Bridge Rail Station – RVL – Expand via shared use with Casa Maya Restaurant***	***SHORTLIST (see Section 3.3)***
M20	**Lebanon Station – RVL Expansion along ROW** (Railroad Ave.)	DROPPED - Does not improve I-78 congestion (a)
M21	**North Branch Rail Station** – RVL – add parking in Industrial Park, with new walkway along tracks to platform	DROPPED - Wetlands resources encroach onto the site to reduce parking yield to 100 spaces or less.
PARK-AND-RIDES - Confluence of I-78/Rt 22/Rt 31		
S12	**Route 523/I-78 Tewksbury Bus P&R** (existing carpooling lot) for existing bus service to Urban Core and proposed S29 and S30 bus services	DROPPED - Major construction (bypass lanes, sidewalks, bus stops) on I-78 required for a parking yield of only 200 stalls; Continue as carpooling lot
S20	**Readington - Rte 22/523 Bus P&R** for proposed S13 and S14 bus services	DROPPED - Too far east to be effective for bus riders to Bridgewater/ Branchburg destinations; possible access problems; small size; potential carpool lot (S13 and S14 eliminated from further study due to low ridership)
S31	**Round Valley State Park – Use Existing Recreational Parking Lot – Bus P&R** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services	DROPPED - Too far from Rt. 22 to be attractive for bus operator; potential car pool location
M10	**Union Township Bus P&R** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services	DROPPED -Shortlist to Intermediate Stage, then dropped due to low ridership

(a) Parking expansion could be pursued to meet local needs.

Alt #	Long List Alternative Name	Screening Result
PARK-AND-RIDES - Confluence of I-78/Rt 22/Rt 31 (Continued)		
M23	***Round Valley Access Road Bus P&R and Rail Station*** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services, and for RVL Rail Service	***SHORTLIST (a) (see Section 3.3)***
M24	**Triangle Site between I-78 and Rt. 22 Bus P&R and Rail Station** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services, and for RVL Rail Service	DROPPED - Shortlist to Intermediate Stage, but was not advanced further in design development, as M23 is the preferred site in this geographical area
M11	**Clinton Town - I-78 Exit 15 Bus P&R** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services	DROPPED - Poor bus access; stream/farm; Highlands protection area
M25	**Sand Hill Road Bus P&R and Rail Station** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services, and for RVL Rail Service	DROPPED - NJT 2003 Study found this site was inferior to M23 due to requirement to improve to Rt. 22 intersection; railroad is in a cut and on a horizontal curve and station would not be visible from street, as well as expensive to construct. Access to/from Rt. 31 south of I-78 was reviewed and is possible, but was found to have historic bridge and residential concerns
M26	**Bray's Hill Road- Rt. 22 and Petticoat Lane Bus P&R and Rail Station** for existing bus service to Urban Core and proposed S13, S14, S29 and S30 bus services, and for RVL rail service	DROPPED - NJT 2003 Study found this site was inferior to M23 due to a stream buffer occupying 5 acres of the 8.5 acre site, railroad is in a cut and rail station would not be visible from street, as well as expensive to construct

(a) The Round Valley site analyzed in the short list is not preferred locally due primarily to forecasted traffic congestion on Route 22. Future analysis will require identification of traffic mitigation strategies, along with further review of alternate sites in this area.

Alt #	Long List Alternative Name	Screening Result
PARK-AND-RIDES - Rt. 31 Corridor (Continued)		
S21	**Washington Borough Bus P&R** for proposed S13 and S14 bus services	DROPPED - Shortlist to Intermediate Stage, then dropped due to low ridership for proposed Bus Services S13 and S14
M13	***Hampton Borough Rte. 31 Bus P&R and Future RVL Rail Station*** for proposed S13 and S14 bus services, and for RVL Extension rail service	***SHORTLIST as a future rail station only (see Section 3.3).*** ***Shortlist to Intermediate Stage, then dropped as a bus P&R due to low ridership for proposed Bus Services S13 and S14.***
M14	**Washington Borough Parking Deck Bus P&R** for proposed S13 and S14 bus services	DROPPED - Too amorphous at this time - up to town to advance deck for downtown and other uses. Serving this site would require extending the bus route. Alternative S21 is better sited for bus operations and convenience to commutershed
PARK-AND-RIDES - Bloomsbury Area		
S16	**I-78 Weigh-in Station – Greenwich Bus P&R** for existing bus service to Urban Core and proposed S29 and S30 bus services	DROPPED - This has become a Medium-term alternative - requires pedestrian overpass and significant site civil work; NJ DOT approval required - institutional issues; impacts local streets; cost and complexity; river buffer affects size of site
M08	**Bloomsbury Truck Stop Bus P&R** for existing bus service to Urban Core and proposed S29 and S30 bus services	DROPPED - Shortlist to Intermediate Stage, then dropped due to concerns regarding the loss truck stop facilities along I-78, inability for co-location with future rail station, as well as low ridership at this site for bus service
M09	***Bloomsbury/Bethlehem I-78 Bus P&R and Future RVL Rail Station*** for existing bus service to Urban Core and proposed S29 and S30 bus services, and for RVL Extension rail service	***SHORTLIST (see Section 3.3)*** ***Preferred site in this geographical area due to close proximity to I-78 and use for both bus and rail service; used for ridership estimation purposes***

Alt #	Long List Alternative Name	Screening Result
PARK-AND-RIDES - Phillipsburg/Alpha Area		
M07	**Alpha Bus P&R and Future RVL Rail Station** for existing bus service to Urban Core and proposed S29 and S30 bus services, and for RVL Extension rail service	DROPPED - Shortlist to Intermediate Stage, then dropped due to low ridership and high cost of new highway interchange; also riders could go to Bloomsbury
M12	**I-78 Highway Median – Greenwich Bus P&R** for existing bus service to Urban Core and proposed S29 and S30 bus services	DROPPED - Shortlist to Intermediate Stage with condition that further intersection feasibility studies are needed; then dropped due to low ridership and high cost of roadway access into site and NJ DOT concerns regarding left handed bus-onlyI-78 on and off ramps
M27	**Lopatcong Bus P&R and Future M&E Rail Station** for existing bus service using Rt. 22 to Urban Core and proposed S29 and S30 bus services with modified routes via Rt. 22, and for M&E Extension rail service	DROPPED - Shortlist to Intermediate Stage as a rail station only; fatally flawed as a bus only P&R – operators would not be attracted to start service at this location as it is too far from existing garage location; then dropped due to low ridership for M&E Rail Extension L05
RAIL EXTENSIONS		
M28	***RVL Extension – Hampton*** Proposed stations: Glen Gardner (M18) and Hampton (M13)	***SHORTLIST (see Section 3.3)***
L04	**M&E Extension - Washington Borough** Proposed stations: Washington Borough (L18)	DROPPED - Shortlist to Intermediate Stage; then dropped due to low ridership

Alt #	Long List Alternative Name	Screening Result
RAIL EXTENSIONS (Continued)		
L05	**M&E Extension to Phillipsburg** Proposed Stations: Mansfield Port Murray (L17), Washington Borough (L18), Warren County Vo-tech – Franklin (L14), Lopatcong (M12) and Phillipsburg (L19)	DROPPED - Shortlist to Intermediate Stage with condition that Mansfield Port Murray (L17) and Warren County Vo-tech – Franklin (L14) Stations were dropped; then dropped due to low ridership.
L09	***RVL Extension – Bloomsbury/Bethlehem*** Proposed Stations: Glen Gardner (M18), Hampton (M13), Bloomsbury/Bethlehem I-78 (M09) and/or Bloomsbury In-town (L16)	***SHORTLIST (See Section 3.3)***
L10	**RVL Extension - Pohatcong/Alpha** Proposed Stations: Glen Gardner (M18), Hampton (M13), Bloomsbury/Bethlehem I-78 (M09) or Bloomsbury In-town (L16), and Pohatcong/Alpha (M07)	DROPPED - Shortlist to Intermediate Stage; then dropped due to elimination of Alpha RVL Station and recognition that Alpha riders would use Bloomsbury/Bethlehem I-78
L12	***RVL Extension to Phillipsburg via CNJ*** Proposed Stations: Glen Gardner (M18), Hampton (M13), Bloomsbury/Bethlehem I-78 (M09) or Bloomsbury In-town (L16), Alpha (M07) and Phillipsburg (L19)	***SHORTLIST (see Section 3.3)***
L13	***RVL Extension to Phillipsburg via NS Lehigh Line*** Proposed Stations: Glen Gardner (M18), Hampton (M13), Bloomsbury/Bethlehem I-78 (M09) or Bloomsbury In-town (L16), Alpha (M07) and Phillipsburg (L19)	***SHORTLIST (see Section 3.3)***

Alt #	Long List Alternative Name	Screening Result
STATIONS ALONG RAIL EXTENSIONS		
M18	**Glen Gardner Rail Station - RVL**	DROPPED - Shortlist to Intermediate Stage; then dropped due to low ridership and recognition than Glen Gardner riders could use High Bridge and Hampton
L14	**Warren County Vo-Tech – Franklin Station – M&E**	DROPPED - Significant wetland issues; Highlands preservation and protection; station not within walking distance of school; ground water contamination
L16	**Bloomsbury - In-town Station - RVL**	DROPPED - Shortlist to Intermediate Stage, then not advanced in design development due to preference for Bloomsbury/Bethlehem I-78 (M09)
L17	**Mansfield Port Murray – M&E**	DROPPED - Highlands preservation; all properties within historic district; poorly situated in commuter shed - commuters would go to Wash Borough as alternative
L18	**Washington Borough Rail Station- M&E**	DROPPED - Shortlist to Intermediate Stage; then dropped due to low ridership
L19	***Phillipsburg Rail Station - M&E and RVL***	***SHORTLIST as an RVL station only (see Section 3.3)***
OTHER		
L20	**Fixed Guideway and Stations in I-78 Median** (mode not defined)	DROPPED - Transfer required to access existing rail and bus modes; "last mile" strategies would be needed similar to commuter rail and bus modes

3.3 Shortlist Alternatives

One bus alternative and one rail alignment to Phillipsburg with multiple phasing scenarios were identified as best meeting the goals and objectives of the study. These shortlist alternatives were developed in terms of operations planning, concept design, implementation phasing, environmental assessment and capital and O&M cost estimating:

- Enhanced bus service along the I-78 corridor to the Urban Core (Alternative S29)
- Extension of the RVL over a period of years into the long-term future to one of three terminals – Hampton (Alternative M28), Bloomsbury/Bethlehem (Alternative L09), or Phillipsburg, via either the inactive CNJ Main Line (Alternative L12) or the active Norfolk Southern freight line (L13).

The bus alternative (S29) provides additional express bus service to the Urban Core from Pennsylvania, with stops at the two new P&R sites (Bloomsbury/Bethlehem (Alternative M08) and Round Valley (Alternative M23). The additional services will mix in with existing services, with stopping patterns optimized by the operator. See additional detail in Section 3.5.

The rail alternative (L12/L13) extends the RVL service from High Bridge to Philipsburg with stops at Hampton and Bloomsbury/Bethlehem, and includes overnight storage facilities to support the proposed year 2030 operating plan, assuming no other storage facilities are implemented on the RVL. See additional detail in Section 3.6.

Shortlist Alternatives and accompanying complementary strategies are summarized in **Table 2.** More detailed information and maps can be found on the shortlist alternatives in Sections 3.5 and 3.6.

In the area of the confluence of I-78/Rt 22/Rt 31, the most oversubscribed commutershed in the Study Area, short-term options have been identified to add a modest amount of parking at the existing High Bridge and Annandale rail stations. Adding parking capacity at existing stations would alleviate some, but not all, of the park-and-ride oversubscription. This area is located east of where I-78 eastbound congestion routinely occurs in morning peak periods. The I-78/Rt 22 interchange is particularly congested. Forecasted traffic on Rt. 22 warrants roadway improvements, even without additional localized traffic generated by proposed transit facilities in this area. The study team developed a concept to address this congestion and presented it to NJDOT. Further refinement of this concept should be considered by NJDOT.

To help alleviate both I-78 congestion and demand for existing park-and-ride facilities in the I-78/Rt 22/Rt 31 area, an increase in bus and rail park-and-ride capacity to the west along I-78 should be undertaken. The proposed Bloomsbury/Bethlehem park-and-ride, which at first would be for bus only and later could become a rail station, is the shortlist park-and-ride option that would best serve this area of the I-78 corridor. However, with Bloomsbury in place, the I-78/Rt 22/Rt 31 area is still forecasted to be oversubscribed. Therefore, parking expansions at Annandale[2] and High Bridge Stations should be considered, which would alleviate most of the remaining unmet demand.

[2] NJ TRANSIT plans to repave and stripe the existing Annandale Station parking lot in the near future.

Table 2: Shortlist Alternatives

Alt #	Alternative Name and Description	Complementary Strategies
BUS SERVICES		
S29	**Additional Express Bus Service in the I-78 Corridor to Urban Core** (Midtown/ Lower Manhattan/ Exchange Place Jersey City)	M2 – Shoulder Bus Lanes I-78 S4 –Traffic Signal Prioritization S5 – Share a lot Carpooling
EXISTING RAIL STATION IMPROVEMENTS		
S26	**Annandale Station RVL –** Expand parking on NJT ROW (50 to 100 stalls) and vacant parcel (280 stalls - in possible second phase)	S2 – Pedestrian Improvements
M19	**High Bridge Station RVL –** Expand parking via shared use with Casa Maya Restaurant (50 stalls)	S2 – Pedestrian Improvements
BUS/RAIL PARK-AND-RIDES		
M23	**Round Valley Access Road Bus P&R and Rail Station** - or existing bus service to Urban Core and proposed, S29 bus services, and for RVL Rail Service	S2 – Pedestrian Improvements S5 – Share a lot Carpooling M30 – I-78/ Rt 22 Interchange Capacity Improvements
M09	**Bloomsbury/Bethlehem I-78 Bus P&R and Future RVL Rail Station -** For existing bus service to Urban Core and proposed S29 bus services (Short term) and for RVL Extension rail service (long term). See below.	S2 – Pedestrian Improvements S5 – Share a lot Carpooling
COMMUTER RAIL EXTENSIONS		
M28	**RVL Extension to Hampton**	S3 – Rail Station Shuttles M5 – RVL Express Operations - Newark/Hoboken S18 – RVL Added Reverse Peak Service S19 – Weekend Service - White House
L09	**RVL Extension to Bloomsbury/Bethlehem**	S3 – Rail Station Shuttles M5 – RVL Express Operations - Newark/Hoboken S18 – RVL Added Reverse Peak Service S19 – Weekend Service - White House
L12	**RVL Extension to Phillipsburg via CNJ**	S3 – Rail Station Shuttles M5 – RVL Express Operations - Newark/Hoboken S18 – RVL Added Reverse Peak Service S19 – Weekend Service - White House
L13	**RVL Extension to Phillipsburg via NS Lehigh Line**	S3 – Rail Station Shuttles M5 – RVL Express Operations - Newark/Hoboken S18 – RVL Added Reverse Peak Service S19 – Weekend Service - White House
STATIONS ALONG RAIL EXTENSIONS		
M09	**Bloomsbury/Bethlehem RVL Rail Station**	S2 – Pedestrian Improvements S5 – Share a lot Carpooling
M13	**Hampton Borough RVL Rail Station**	S2 – Pedestrian Improvements S5 – Share a lot Carpooling
L19	**Phillipsburg RVL Rail Station**	S2 – Pedestrian Improvements

3.4 Future No Build

3.4.1 Existing NJ TRANSIT Stations

The future No Build includes no parking expansions at existing stations. For ridership forecasting purposes, parking capacity was capped at Annandale and High Bridge Stations in the No-build condition. However, parking capacity was not capped from Lebanon to Raritan. Parking expansions have been identified at most of these stations as shown in **Table 1.**

3.4.2 Commuter Rail Service

The Raritan Valley Line is assumed to operate under ARC Build year 2030 conditions and volumes. The ARC A.M. Peak Build Year 2030 service plan will increase RVL service and provide a one seat ride to Manhattan. **Table 3** shows weekday morning peak period frequencies on the RVL used in ridership estimation. The Baseline year for current conditions was 2008.

Table 3: Baseline and Future No Build Raritan Valley Line Rail Service

Morning Peak (4-hr) Weekday Trains				
	Baseline to:		No Build (Year 2030) to:	
	PSNY	Newark	PSNY	Newark or Hoboken
Starting at Raritan or Plainfield	0	8	4	10
Starting at High Bridge	0	4	5	4
Total RVL Service	0	12	9	21

3.4.3 Commuter Bus Service

Future No Build commuter bus and Wheels service is expected to be similar to the 2008 Baseline. As shown in Table 4, commuter bus service originates in Pennsylvania, with service currently operated by Trans-Bridge Lines making stops in New Jersey as far east as Clinton Township. Bieber Tours also operates along I-78 but does not make any stops in New Jersey. This study does not recommend a specific bus operator for any new service recommended. Any private operator with operating rights could be eligible to provide the service NJ Transit would not be eligible as their operating rights for commuter service extend west only to Route 206 in Raritan Borough. Any new service operating west of that line in Somerset, Hunterdon or Warren counties would be provided by a private operator.

The vast majority of commuter bus service in the study corridor is destined for the Port Authority Bus Terminal in New York via I-78, the New Jersey Turnpike and the Lincoln Tunnel. AM peak inbound service to New York utilizes the Lincoln Tunnel's Express Bus Lane (XBL). Although both the XBL and the PABT are near capacity in the peak periods, the evaluation of bus alternatives assumed the ability to add additional inbound peak bus service to New York.

Table 4: Baseline Bus Service

Weekday Bus Service Levels – Trans-Bridge Lines

Allentown/Bethlehem, PA to PABT			
Direction	AM	Midday	PM
Eastbound	24*	7	3
Westbound	3	8	24
Bethlehem, PA/Clinton, NJ to Lower Manhattan			
Direction	AM	Midday	PM
Eastbound	8*	--	--
Westbound	--	--	7
Bethlehem, PA/Clinton, NJ to Jersey City			
Direction	AM	Midday	PM
Eastbound	2	--	--
Westbound	--	--	2

Trans-Bridge service times counted at Clinton P&R
* Some trips operate Monday-Thursday only

Weekday Bus Service Levels – Bieber Tourways

Hellertown, PA to PABT			
Direction	AM	Midday	PM
Eastbound	9	6	4
Westbound	2	7	10

Weekday Bus Service Levels – NJ TRANSIT/ WHEELS

Clinton, NJ to Somerville, NJ (Route 884)[3]			
Direction	AM	Midday	PM
Eastbound	2	3	2
Westbound	2	3	3
Phillipsburg, NJ to Easton, PA (Routes 890, 891)			
Direction	AM	Midday	PM
Eastbound (both routes)	6	7	3
Westbound (both routes)	5	9	2
Downtown Hackettstown, NJ Shuttle (Route 973)			
Direction	AM	Midday	PM
Orange Route	2	6	2
Blue Route	3	6	2

[3] Route 884 was discontinued in the 2010 NJ TRANSIT budget cutbacks.

3.5 Shortlist Bus Alternatives

Following the alternatives screening process, one bus route (Long List Alternative S29) remained active for analysis (see **Figure 2**). The Short List bus alternative includes new express bus service to the Urban Core with a new park-and-ride in Bloomsbury/Bethlehem and a second park-and ride in the area where the RVL crosses Route 22 in Clinton Township. The route begins in Pennsylvania, and travels via I-78 to the Urban Core. It theoretically serves the M09 Bloomsbury/Bethlehem park-and-ride and M23 Round Valley site, but the actual implementation of the service would be mixed in with existing services towards an optimal balance of service frequency and number of stops for all existing and proposed park-and-rides. For purposes of developing ridership forecasts, the destination was assumed to be the Port Authority Bus Terminal (PABT) in New York. Pennsylvania service was assumed to operate out of the William Penn park-and-ride on PA-33 in Bethlehem Township, Pennsylvania.

3.5.1 Service Plan and Equipment

The proposed bus service necessarily interacts with existing routes operated in the corridor by Trans-Bridge Lines, though it could be operated by any service provider. The new service proposes a total new service of four buses an hour, with each park-and-ride location served by three buses per hour.

The proposed service operates all day and consists both of new service and diversions of existing I-78 service to the new facilities. The service plan shown in the following table was developed to provide relief to the over-capacity Clinton Point park-and-ride, while providing opportunities for express services from the Pennsylvania and Bloomsbury areas.

Table 5: Morning Peak Bus Service

New or Existing Bus	6-10 AM Buses	Origin	Description
New	1	William Penn	Super Express from William Penn
New	3	William Penn	Stops only at William Penn and Round Valley park-and-rides
New	6	William Penn	Stops only at William Penn, Bloomsbury/ Bethlehem and Round Valley
Existing	3	Allentown/Bethlehem	Existing service stops at Round Valley instead of Clinton Point
Existing	3	Easton/Philipsburg	Existing service adds stop at Bloomsbury/ Bethlehem

Off-peak service will operate hourly, serving William Penn, Bloomsbury/Bethlehem and Round Valley. This service may operate either as a stand-alone service, or as additional stops on existing I-78 service.

Nine new cruiser (over the road style) buses are estimated to be needed to operate this service, with two spares. The storage and garage space needed for these new vehicles is dependent on the operator, and the spare capacity in their existing facilities. If the operator has existing capacity, storage and upkeep costs would be minimal (assumed for cost estimating). If new facilities are needed, these costs will rise substantially.

3.5.2 Route

The full service tested for ridership estimation purposes starts at the existing William Penn park-and-ride at the intersection of PA-33 and William Penn Highway in Northampton County, PA. The service then proceeds south on PA-33 to I-78, where it turns east. In New Jersey, it serves the proposed Bloomsbury/Bethlehem Bus park-and-ride and Future Rail Station (see Section 3.5.3) by exiting at Route 173 eastbound (I-78 Exit 7). The route then returns to I-78 eastbound via Route 173 westbound, the Route exits onto Route 22 at exit 18. Traveling via Route 22 eastbound, the route turns right onto the Round Valley Access Road, and then left into the Round Valley Access Road park-and-ride (see Section 3.5.3). The route exits the park-and-ride directly onto Route 22 eastbound. Turning left onto Cokesbury Road via a jughandle intersection, the bus proceeds northbound to I-78 eastbound. The remainder of the route is express to New York via I-78, the NJ Turnpike and the Lincoln Tunnel.

3.5.3 Bus Park-and-Rides

The proposed bus service as tested makes use of two new facilities, in Bethlehem Township near Bloomsbury Borough (Long List Alternative M09) and in Clinton Township near Round Valley State Park (Long List Alternative M23). Both of these sites could be used for rail service as well. Actual stopping patterns could involve only one of these sites and stop at existing park-and-rides, on any trip.

Bloomsbury/Bethlehem

The Bloomsbury/Bethlehem site is located on Route 173 just east of I-78 exit 7 (see **Figure 4**). This site is co-located with a New Jersey Department of Transportation (NJ DOT) maintenance facility and salt dome. In a first phase, only NJ DOT - owned property and road right-of-way would be used for the bus park-and-ride. Ridership forecasts (see Section 6) show a need for up to 215 spaces serving 215 bus riders and an allowance for 20 carpooling spaces. This maximum need is based on the following conditions:

- No other bus park-and-rides would be constructed in the Lehigh Valley beyond planned expansions at Wm. Penn/Rt. 33 and at Rt. 412, or constructed in New Jersey. If Round Valley Access Road were implemented, parking needs would be reduced by 135 spaces.
- No extension of rail service is implemented. If RVL rail service were extended to Bloomsbury or Phillipsburg, most ridership at this location would use rail service.
- Bus shoulder running is implemented on I-78 (Complementary Strategy M02).
- Carpooling is allowed at this site (Complementary Strategy S05).

Up to 150 spaces would be constructed if the project were kept to NJDOT-owned property, and with little impact on NJ DOT facilities. Additional capacity could be gained with the taking of private property, and the reconfiguration of NJ DOT facilities. Access into and out of the site is detailed in Section 3.5.3. No off-site access improvements are needed.

Round Valley[4]

The Round Valley site is located on the southwest corner of the intersection of Route 22 and Round Valley Access Road in Clinton Township, and is located along the NJ TRANSIT Raritan Valley Line, between High Bridge and Annandale Stations (see **Figure 3**). The site is privately

[4] The Round Valley site analyzed in the Short List is not preferred locally due primarily to forecasted traffic congestion on Route 22. Future analysis will require identification of traffic mitigation strategies, along with further review of alternate sites in this area.

owned and undeveloped, and has property available in excess of parking demands. Should this facility be developed, it is assumed that the Wall Street and Jersey City bus services currently operating from the Annandale Square park-and-ride will instead utilize this site. Annandale Square is currently operating under a lease agreement between the property owner and NJ DOT. Moving the service will both avoid lease payments and consolidate service so that fewer off-highway stops are needed. A new rail station would be constructed with the bus park-and-ride. Ridership modeling results (see Section 6) show that up to 240 spaces for bus riders (580 spaces overall for bus and rail with a 20 space allowance for carpoolers) is needed. This maximum need occurs under the following conditions:

- No other bus park-and-rides would be constructed in the Lehigh Valley beyond planned expansions at Wm. Penn/Rt. 33 and at Rt. 412.
- Bloomsbury/Bethlehem is constructed.
- Annandale Square is relocated (100 spaces), and excess demand is absorbed from the existing nearby Clinton Point Bus park-and-ride
- No extension of rail service is implemented. Extending the RVL to either Bloomsbury/ Bethlehem or Phillipsburg will reduce bus demand by 65 spaces.
- Bus shoulder running is implemented on I-78 (Complementary Strategy S05).
- Carpooling is allowed at this site (Complementary Strategy M01).

As this site is along the existing RVL, it would be both a rail station and bus park-and-ride from initial opening. If the rail station were to not be implemented, more bus ridership would be generated.

Access into and out of the site is detailed in Section 3.5.3. Improvements to the nearby I-78/Rt. 22 interchange are needed to address traffic congestion, and are addressed under Complementary Strategy M30 described in Section 3.5.4.

3.5.4 Complementary Strategies for Bus Services

I-78 Shoulder Running

A complementary strategy to support new and existing bus services is the implementation of bus lane in the I-78 shoulder in designated areas east of Clinton. This bus lane would be restricted to locations and time periods when general traffic flow on I-78 is below 35 mph during peak hours. I-78 shoulder running (Long List Alternative M02) would allow buses (current service and proposed) to operate on strengthened highway shoulder lanes. New Jersey residents would comprise 52% of the beneficiaries of this improvement. Both Eastbound and westbound shoulder operations are proposed, where sections of I-78 are forecast to have speeds at or under 35 mph in the year 2030. Eastbound, shoulder operation would be between milepost 18.10 (Raritan River Bridge) and milepost 27.11 (Rattlesnake Bridge Road), which would be used by buses during the AM peak period. Westbound shoulder operation would be between milestone 30.65 (I-287) and milepost 27.11 (Rattlesnake Bridge Rd).

Bus shoulder running would reduce travel time and improve on-time performance. New Jersey currently operates shoulder running bus lanes on Route 9 in central New Jersey. Minneapolis, Minnesota has also implemented interstate shoulder bus lanes similar to the I-78 application. I-78 shoulder running is expected to reduce travel time by 9 minutes in the eastbound direction and by

2 minutes for each westbound peak period bus operating through the impacted segment. A more detailed description is located in **Appendix H**.

Carpooling

Carpooling at bus park-and-rides (Long List Alternative S05) should be considered especially where capacity in excess of what is needed for bus service can be constructed at an incremental increase in cost. Ridewise, HART and TransOptions, the three Transportation Management Associations (TMA's) working in the Study Area, manage a significant number of carpools. Carpooling is not a mode included in the ridership model and so a precise forecast of carpooling demand has not been developed.

I-78/ Rt. 22 Interchange Capacity Improvements

The Route 22/Interstate-78 (I-78) Interchange Capacity Improvements concept proposes striping an additional westbound lane on Route 22 from Petticoat Lane to the merge with I-78 to improve the capacity of Route 22 in this area. Westbound Route 22 currently transitions to one lane west of the Petticoat Lane intersection. This condition has been suggested as the cause of recurring congestion in the PM peak period. The restriping would result in lane and shoulder widths that could be regarded as substandard. Also, the removal of the existing U-Turn ramp from Rt. 22 eastbound to the Rt. 22 westbound on ramp (Ramp D) was assumed for this concept, with relocation of the U-turn function to a proposed jughandle and the Exxon Drive signalized intersection. Further design development and review with NJ DOT is needed on determining if standard lane and shoulder widths could be provided without widening of the highway facilities.

While the improvement concept has been identified within this study, the feasibility of the concept has not been determined and is dependent on more detailed design and NJ DOT a traffic study. The traffic study performed so far indicates an improvement would be made to the Petticoat Lane intersection. Further studies need to be undertaken to identify if queuing would occur at the I-78 westbound on ramp.

A full report and proposed striping plans, as well as a traffic analysis, is located in **Appendix J**.

Figure 2: Alternative S29 Bus Alignment

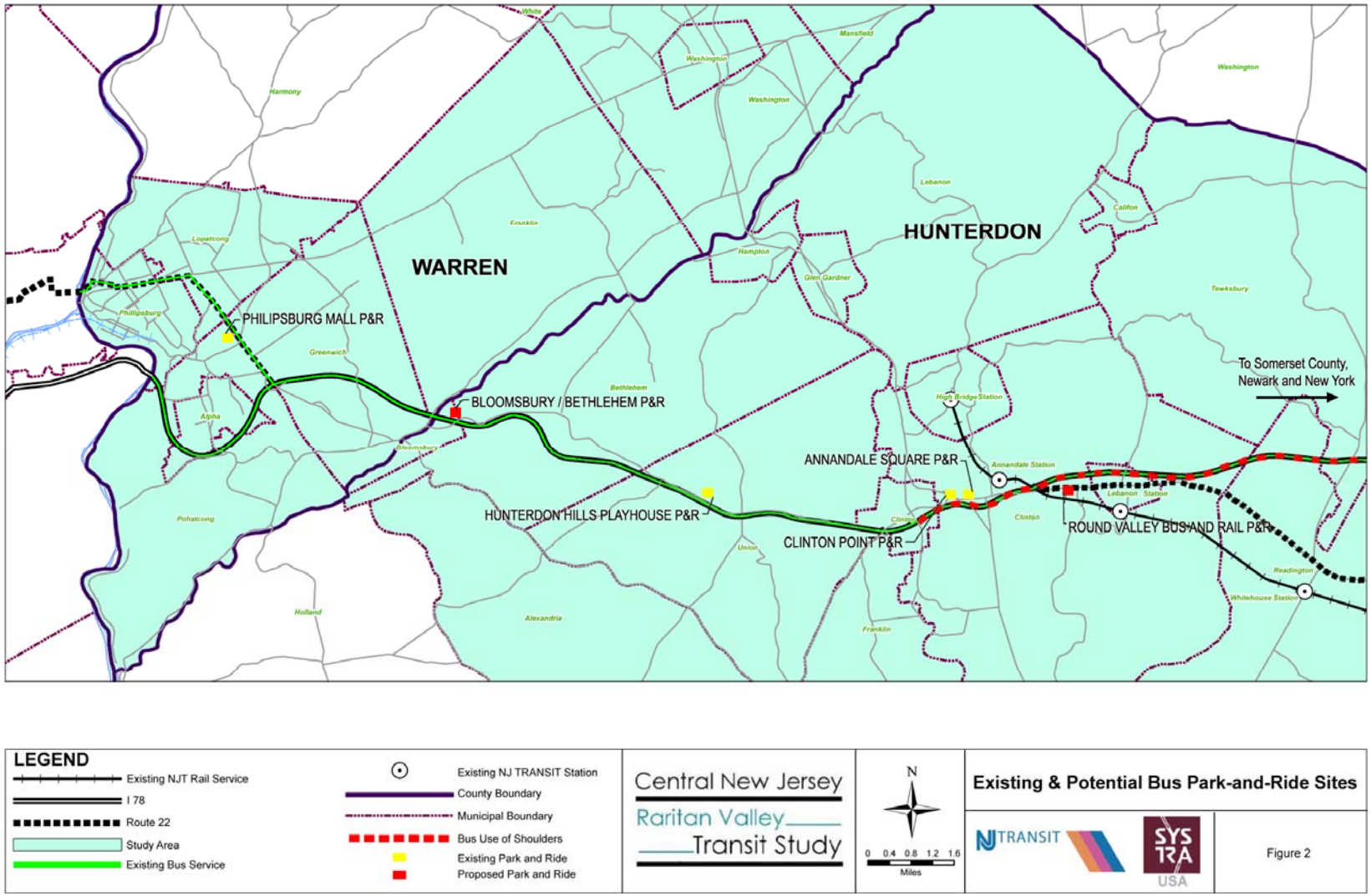


Figure 3: Alternative M23 Round Valley Park-and-Ride (Bus and Rail)

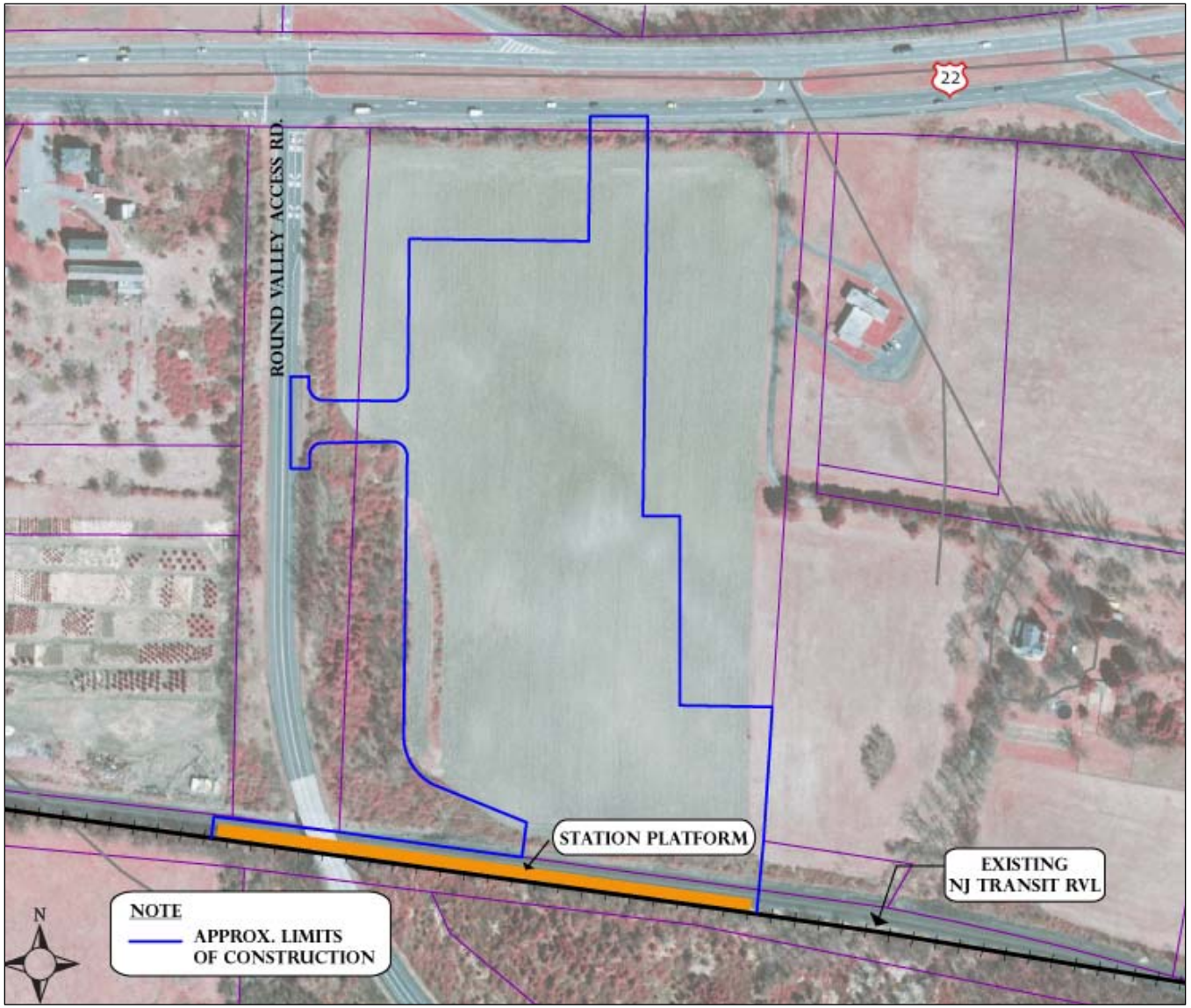
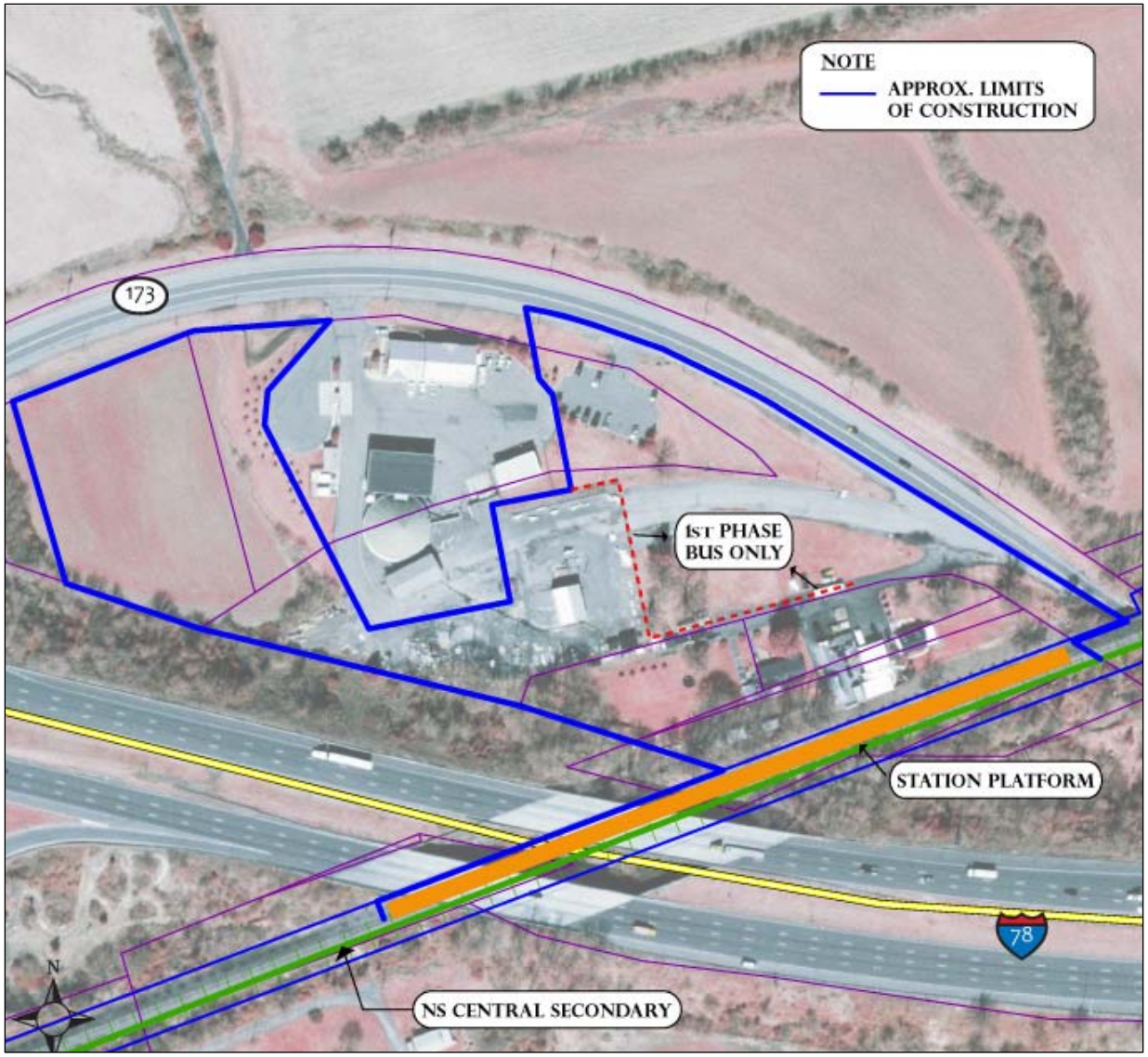


Figure 4: Alternative M9 Bloomsbury/Bethlehem Park-and-Ride (Bus and Rail)



3.6 Shortlist Rail Alternatives

The Short List rail alternatives include four RVL extensions to three terminals, either permanently or as a phased approach. The terminal locations are Hampton, Bloomsbury/Bethlehem and Phillipsburg. A potential train storage yard site is included at the terminal point of each extension. Following the alternatives screening process, four rail alternatives remained active for analysis. All four alternatives extend the RVL westward from High Bridge, and terminate at three different locations. Two of the alternatives include service between Bloomsbury/Bethlehem and Phillipsburg (see **Figure 5**). All alternatives would assume extending all trains operating to and from High Bridge in the Year 2030 operating plan. This operating plan will require an overnight storage and maintenance facility for all trains starting and ending operations at the proposed terminal. **Table 6** summarizes the characteristics of the shortlist rail alternatives. Conceptual right-of-way, yard and station plans for the shortlist alternatives are located in **Appendix H**.

Table 6: Shortlist Rail Alternatives

Long List Alternative # and Description	Distance from High Bridge	Proposed Stations	Trainsets Needed and Yard Location	Comments
M28 RVL Extension to Hampton via former CNJ Main Line	5.3 miles	Hampton	8 trainsets at Hampton Yard	One 2 mile-long passing siding between High Bridge and Hampton
L9 RVL Extension to Bloomsbury/ Bethlehem via former CNJ Main Line	12.2 miles	Hampton Bloomsbury/Bethlehem	9 trainsets at Bethlehem Yard	Two 2 mile-long passing sidings (between High Bridge and Hampton and Hampton and Bloomsbury/Bethlehem) Could be implemented as a second phase
L12 RVL Extension to Phillipsburg via former CNJ Main Line	20.0 miles	Hampton Bloomsbury/Bethlehem Phillipsburg	9 trainsets at Phillipsburg Yard	Two 2 mile-long passing sidings (between High Bridge and Hampton and Hampton and Bloomsbury/Bethlehem) Could be implemented as a second or third phase
L13 RVL Extension to Phillipsburg via former CNJ and NS Lehigh Line	20.0 miles	Hampton Bloomsbury/Bethlehem Phillipsburg	9 trainsets at Phillipsburg Yard	Two 2 mile-long passing sidings (between High Bridge and Hampton and Hampton and Bloomsbury/Bethlehem) Could be implemented as a second or third phase

3.6.1 Service Plan and Equipment

The service plan for all alternatives is similar. All proposed High Bridge starts in the morning and ends in the evening will be extended to the proposed terminal. In the morning 4-hr peak nine trains would operate, providing approximately 30 minute frequency (see **Table 3**). Of those trains, four would operate to Newark Penn Station, while five would operate to New York Penn Station Expansion (NYPSE). In the midday, bi-directional hourly service would be provided. Consists will be made up of ten bi-level coaches with one dual mode locomotives placed at each end. Trains will operate with diesel propulsion along the RVL extension and on the existing RVL. On the Northeast Corridor near Newark, propulsion for new York-bound trains will change to electric so that the trainset can operate in the Hudson River tunnels and at NYPSE.

All trains will serve all proposed stations west of High Bridge, and a skip stop pattern will be used east of High Bridge in morning and evening peak periods to balance the ridership at each station, with the needed frequencies to meet that ridership to both Newark and New York, as well as to reduce overall travel times. Because the RVL's two-track alignment is bi-directional service east of Raritan, the ability to operate express service is limited. Travel times between each proposed station and the three eastern terminals are shown in **Table 7**.

Table 7: Estimated Rail Travel Times

Terminal	**Travel time to**		
	Newark	**Hoboken**	**PSNYE**
Alternative	**Direct**	**Transfer at Newark**	**Direct**
High Bridge - MP 52.2	1 hour 27 minutes	1 hour 56 minutes	1 hour 40 minutes
Hampton - MP 56.8	1 hour 34 minutes	2 hours 3 minutes	1 hour 47 minutes
Bloomsbury - MP 63.8	1 hour 43 minutes	2 hours 12 minutes	1 hour 56 minutes
Phillipsburg via CNJ - MP 72.1	1 hour 52 minutes	2 hours 21 minutes	2 hours 5 minutes
Phillipsburg via NS – MP 72.1	1 hour 52 minutes	2 hours 21 minutes	2 hours 5 minutes

3.6.2 Alignment/Right-of-Way

Alternatives M28, L09 and L12

Except for Alternative L13, the NJ TRANSIT-owned former CNJ Main Line right-of-way will be used for the RVL extension alternatives. Two portions of the right-of-way are used by the Norfolk Southern Railway (NS) for freight service under trackage rights agreements with NJ TRANSIT. Between MP 60.1 and 66.6, local freight service is operated by NS. This freight branch is the NS Central Secondary. NS accesses the Central Secondary from the NS Lehigh Line via the Central Secondary Connector at MP 66.6 in Pohatcong. The Central Secondary extends eastward to Pattenburg Road in Bethlehem at MP 60.1. Current freight activity is light. It is assumed that in any commuter rail scenario, freight service would be operated between passenger trains on a single track.

NS also uses the former CNJ Main Line for its Lehigh Line through freight route from Greens Bridge at MP 70.7 in Phillipsburg across the Delaware River. The parallel former Lehigh Line right-of-way is

inactive and is located on the south side of the active right-of-way and leads to the former Lehigh Valley Line bridge over the Delaware River.

A short distance east of the east end of the former CNJ Main Line Delaware River Bridge at MP 72.4 is the point where ownership of the former CNJ Main Line right-of-way changes from NJ TRANSIT to NS. This section between Greens Bridge and the Delaware River Bridge is heavily used by NS on a single track. For passenger service, a second track would be constructed on the north side of the existing track with 14-foot track centers, with the goal of separate freight and passenger operations, and possibly separate dispatching. Specific joint operation issues need to be addressed, including inspection and maintenance activities which may impact each other's operations.

A second option to separate freight and passenger activity is to relocate the freight operation back to the former Lehigh Valley Line right-of-way, which is still under NS ownership. However, the former Lehigh Valley Line Delaware River Bridge would be used, requiring its rehabilitation. Also, grade crossings on the Lehigh Line in Phillipsburg would be reinstituted.

The existing RVL is double tracked east of Raritan and single tracked west of Raritan Yard, with passing sidings located for bi-directional meets. The single track/passing siding concept is proposed to be continued on the extensions. Passing sidings are located where meets would occur and where infrastructure to support two tracks requires no significant incremental cost. Two-mile long passing sidings are proposed at Hampton, with the Hampton Station platform within and at the west end of the siding, and at Bethlehem, with the Bloomsbury/Bethlehem Station platform located within and at the west end of the siding.

Because of the existing double track embankment, the civil work needed to restore rail operation is minimal, with one exception. All existing track, ties, special trackwork, ballast and subballast will be replaced with new materials meeting NJ TRANSIT's current design and materials specifications. Track geometry has been optimized for passenger service including increased superelevation where possible. Travel time between Phillipsburg and High Bridge is 25 minutes, compared with 35 minutes (including a fourth stop in Glen Gardner) in 1981 when passenger trains were last run. Bridge structures will be rehabilitated and replaced as needed (see Structural Assessment in **Appendix I**) and retaining walls and culverts will be rehabilitated. Communications and signals systems will be constructed according to NJ TRANSIT's design criteria, including a backbone fiber optics line High Bridge and the western terminal.

A significant civil item is needed for Alternative L12, as noted above, which is to construct a single track bridge over I-78 at MP 68.3 in Alpha. While I-78 is depressed somewhat at the bridge location, significant embankment and retaining wall work is needed for the approaches to the bridge on both sides.

Alternative L13

In Alternative L13, passenger trains would operate on the NS Lehigh Line between the NS Central Secondary Connector at MP 66.6 to Phillipsburg Station. This segment is the former NS Lehigh Valley line and has embankment that is two tracks and in some places three tracks wide. Currently NS operates on a single track. The trackage rights agreement that allows NS to use the former CNJ main Line right-of-way in Phillipsburg allows for NJ TRANSIT to use the NS Lehigh Line in this segment as long as freight operations are not impacted. This agreement allowed NJ DOT to construct one railroad bridge over I-78. This bridge has a two-track deck, so that a track for passenger use could be installed. Further coordination with NS is needed on the use of Lehigh Line right-of-way.

3.6.3 Rail Stations

Expansion opportunities at existing RVL stations have been identified at Annandale (to 100 spaces on the railroad right-of-way and 280 spaces on a parcel that would require acquisition) and High Bridge (50 spaces as a shared use) Stations (see **Figures 6 and 7**, respectively).

The proposed rail extensions will service new stations as listed in **Table 6**. The new stations are Hampton (Long List Alternative M13), Bloomsbury/Bethlehem (Long List Alternative M09) which could operate as a bus-only park-and-ride as described in Section 3.5.3 and Phillipsburg (Long List Alternative L19).

In addition, the Round Valley Access Road park-and-ride (Long List Alternative M23) is located along the active RVL and could be implemented independently without extending rail service. As this proposed station was originally conceived to serve as a relocated Annandale Station, the relocation assumption (rather than an additional station) is assumed for the travel times shown in **Table 7**.

Round Valley Access Road Station[5]

The Round Valley site is discussed in Section 3.5.3 as a bus park-and-ride. A new rail station would be constructed with the bus park-and-ride, so that parkers could use either service in either direction (see **Figure 3**). The rail station would be located in a cut at the south end of the property. Rail-specific improvements include the following:

- Side platform 12 wide by 880 feet long to serve a 10-car trainset.
- Relocation of existing tacks to allow for a future second track at the station. With the future second track, the platform would be widened to a 26' wide center platform, with two elevator/stair cores and an overpass.
- Parking is located somewhat away from the platform to avoid a significant slope and reduce the scope of earthwork. However, significant earthwork is needed to achieve required grades for the parking facility as well as to make the rail station visible from Rt. 22.

Ridership modeling results (see Section 6) show that up to 340 spaces for rail riders (600 spaces overall for bus and rail with a 40 space allowance for carpoolers) are needed. This maximum need occurs under the following conditions:

- No other bus park-and-rides would be constructed in the Lehigh Valley beyond planned expansions at Wm. Penn/Rt. 33 and at Rt. 412.
- Bloomsbury/Bethlehem bus park-and-ride is constructed.
- Annandale Square is relocated (100 spaces).
- Absorption of excess demand from the existing nearby Clinton Point Bus park-and-ride
- No extension of rail service is implemented. Extending the RVL to either Bloomsbury/Bethlehem or Phillipsburg will reduce rail demand by 200 spaces. Extending the RVL to Hampton would reduce rail demand at Round Valley by a lesser amount.
- Bus shoulder running is implemented on I-78 (Complementary Strategy S05).
- Carpooling is allowed at this site (Complementary Strategy M01).

[5] The Round Valley site analyzed in the Short List is not preferred locally due primarily to forecasted traffic congestion on Route 22. Future analysis will require identification of traffic mitigation strategies, along with further review of alternate sites in this area.

Hampton Station

The Hampton Rail Station park-and-ride site is located in the southeast quadrant of Rt. 31 and Lackawanna Street in Hampton Borough (see **Figure 8**). The site is comprised of several small undeveloped lots, and has some wetlands on-site which may impact parking capacity. The station platform is located near the Main Street UG bridge, where tangent track is located. The rail alignment is two-track at the platform. Improvements include the flowing:

- Center platform 26 feet wide by 880 feet long to serve a 10-car trainset, partially on the Main Street bridge which is five tracks wide.
- Two platform access points for access to the park-and-ride and to Main Street for walk-up ridership. The park-and-ride access would have ADA compliant access with two vertical cores with stairs and elevators and an overpass. At Main Street, stairs to the platform from street level would be provided.
- Parking is located away from abutting residential properties and to avoid on-site wetlands.

Ridership modeling results (see Section 6) show that up to 195 spaces are needed. This maximum need occurs under the following conditions:

- Rail service is extended to Bloomsbury/Bethlehem. Only a small increase in ridership would result if rail service was terminated at Hampton, as it is not located to attract riders form the I-78 corridor that would have gone to Bloomsbury/Bethlehem.
- Round Valley Access Road is not implemented (if implemented, demand would be reduced by 55 spaces).

Park-and-ride access is restricted to Rt. 31, so that regional traffic does not circulate through residential areas of Hampton Borough. Two options for site access are proposed: using Lackawanna Street, as close to the interaction with Rt. 31 as possible, or directly off of Rt. 31 opposite Mackenzie Street. Both options require a traffic signal for left turns onto and off of Route 31 without congestion. Traffic signal warrants, however, may not be met. Traffic considerations are described in Section 4.

Bloomsbury/Bethlehem Station

The Bloomsbury/Bethlehem site is discussed in Section 3.5.3 as a bus park-and-ride, either in a first phase or with the development of the rail station. As a rail station, access to the rail line requires that two residential properties be taken. The site with these acquisitions would be too small for the maximum ridership scenarios. The rail alignment is two-track at the platform (see **Figure 4**).

Rail-specific improvements include the following:

- Center platform 26 feet wide by 880 feet long to serve a 10-car trainset, partially under the I-78 bridges, which has enough lateral clearance to accommodate the proposed platform/track configuration.
- Platform access via a pedestrian tunnel, with stairs and an elevator.

Ridership forecasts (see Section 6) show a need for up to 575 spaces serving 704 rail riders and 134 bus riders. This maximum need is based on the following conditions:

- No other bus park-and-rides would be constructed in the Lehigh Valley beyond planned expansions at Wm. Penn/Rt. 33 and at Rt. 412, or constructed in New Jersey. If Round Valley Access Road were implemented, parking needs would be reduced by 300 spaces.
- No further extension of rail service to Phillipsburg is implemented. If RVL rail service were extended to Phillipsburg, parking needs would be reduced by 130 spaces.

Up to 435 spaces could be constructed in the full build out, without the use of retaining walls and further use of NJ DOT I-78 right-of-way, which is on a high embankment, or relocation of NJ DOT maintenance facilities. The maximum number of spaces could be obtained with either of these actions.

Phillipsburg Station

The Phillipsburg Rail Station is located off of South Main Street near Sitgreaves Street, on the east side of the Main Street overhead bridge (see **Figure 9**). The station site is somewhat co-located with Phillipsburg Yard facilities. The property is owned by NJ TRANSIT, the City of Phillipsburg and NS. The rail alignment is three-track at the platform, with storage tracks located to the north of the platform tracks. Improvements include the flowing:

- Center platform 26 feet wide by 880 feet long to serve a 10-car trainset. The three tracks at the platform are (from south to north) the relocated NS Lehigh Line freight track, the passenger main track, and a passenger siding track which terminates at the platform. The station platform is located between the passenger main and siding tracks, and is partly located on a curve of 1 degree 15 minutes. Station parking is located to the south of the freight track.
- Platform access points are to the station park-and-ride and to South Main Street, near the overhead bridge, for walk-up access from residential areas further west. The park-and-ride access requires two vertical cores with stairs and elevators and a pedestrian overpass crossing the Lehigh Line and passenger main tracks. Access to South Main Street is at-grade.
- Track geometry allows for connecting the passenger siding track to the passenger main track in the event passenger rail service is extended to Pennsylvania.
- Parking is located directly off of South Main Street. Access for maintenance facility and storage yard fuel deliveries is co-located with parking access (see Section 3.6.4).

Ridership forecasts (see Section 6) show a need for up to 140 spaces serving 175 rail riders.

3.6.4 Rail Facilities

Overnight storage, inspection, fueling, cleaning and running repair for nine trainsets (Phillipsburg and Bloomsbury/ Bethlehem) or eight trainsets (Hampton) are needed. Yard layouts have been developed for service to Phillipsburg and Bloomsbury/Bethlehem that accommodate all program needs, including fuel truck access. Yards locations were selected to be as close to terminal stations as possible to reduce non revenue operation time, away from grade crossings, where property takings do not require displacements, and on grades of less that 0.5%. The yard at Hampton would be similar to the yard at Bloomsbury/Bethlehem. Features of each yard location are as follows:

Bethlehem Yard

Bethlehem Yard is located on NJ TRANSIT right-of-way as well as private property now used for farming on the north side of the railroad right-of-way. It is located east of Bloomsbury/Bethlehem Station and west of the Person Road grade crossing (see **Figure 10**).

- All storage tracks are double ended to support the potential extension of passenger service to Phillipsburg and/or Pennsylvania; also allows a secondary access to and from the yard in case of equipment failure and provides flexibility in serving the station which is located west of the yard.
- Yard activities and movements from station to yard will generally occur off the passenger main, and will make use of the Bethlehem passing siding.
- Site is organized for efficient operations. All program functions are located in one area.
- General yard access is from Person Road and Route 173. No sensitive land uses will be impacted by yard access.

- The private farm property proposed to be partially taken is encumbered so that private development is prohibited under the State of New Jersey's Farmland Preservation Program (see Section 4). The proposed taking will reduce the acreage available for farming, but not displace the farming use.
- A second yard layout option should be considered. This layout would move the yard to the south side of the railroad right-of-way, and would avoid taking farm property. However, partial of full takings of several properties would be needed, possibly with residential or commercial displacements.

Phillipsburg Yard

Phillipsburg Yard is located on property owned by NJ TRANSIT, Town of Phillipsburg and NS, east of Phillipsburg Station (see **Figure 11**).

- Six of eight yard storage tracks are double ended to support the potential extension of passenger service to Pennsylvania.
- Yard activities and movements from station to yard will generally occur off the passenger main, and are completely away from the Lehigh Line track.
- Constrained, linear site between the CNJ Main Line and NS Washington Secondary requires spread out functions and storage locations, which would lead to operational inefficiencies
- At the east end of the site, a portion of park property encumbered by Green Acres funding must be acquired. The function of the park is not impacted (see Section 4).
- General yard access is from Brainard Street, using the existing grade crossing over the Washington Secondary. Fuel delivery is located in the station parking lot and is directly accessed from South Main Street. This will allow fuel trucks to avoid circulating through residential areas near Brainard Street.

Hampton Yard

Hampton yard would be located west of Hampton Station, between Lower Skillman Street and the Bethlehem Township border. Property to be used includes the NJ TRANSIT right-of-way and private property on the north side of the right-of-way that is classified as farmland, but has been observed to not be in active farm use. This property was previously used for the storage of coal, and may be considered a former industrial use.

A concept plan has not been prepared for this site. The yard layout would be similar to Bethlehem. Access would be from Lower Skillman Road and Baylor Street, which is in a residential area. The general location of the yard is shown in **Figure 12**.

3.6.5 Complementary Strategies for Rail Services

In addition to the strategies described below, the Carpooling and I-78/ Rt. 22 Interchange Capacity Improvements listed in Section 3.5.4 as complementary strategies for bus services also apply to rail services.

Rail Station Shuttles

Bus or van shuttle service from rail stations to employment locations in the Bridgewater (Long List Alternative S03) was proposed to provide service to the same market areas as the direct bus service, which was screened out due to low ridership, but at a lower cost. After review of many shuttle routes and connecting stations, shuttle service at Raritan Station were determined to have the greatest likelihood of meeting NJ TRANSIT's requirements for ridership and operating costs. The proposed shuttles would meet inbound AM peak period trains at Raritan Station and provide access to major employers along

Route 202, Route 206 and Route 22 in Raritan, Somerville and Bridgewater. NJ TRANSIT will continue to work with the TMA's to develop shuttle services.

Three shuttles departing Raritan Station were proposed:

- Downtown Raritan and Route 202/Ortho-McNeill
- Route 206 North of Route 22
- Route 22 West, including Somerset Corporate Center, Ethicon and MetLife

For a complete description of the routes and their forecasted ridership, costs and revenue, see Section 6 and **Appendix G.**

Express Operations on the RVL

The RVL, east of Raritan, has two tracks supporting bi-directional service. There is currently no ability to provide same direction overtakes of local trains to reduce travel times. A test of whether constructing a third track to allow overtakes would provide a travel time savings and associated ridership increases was prepared as Long List Alternative M05.

A third track was added for operations simulation purposes between Raritan and Plainfield, a segment of the RVL that could support a third track as the right-of-way is four tracks wide. The express operation would bypass Raritan, Bridgewater, Bound Brook and Dunellen Stations, and overtake local trains originating at Raritan Yard. The existing inbound track would become the express middle (third) track, and new track would be constructed on the inbound side. Station facilities would be relocated as needed. A stop would be made at Somerville, which is already set up for a three track alignment, and because it has an eastbound morning de-boarding market.

The operations analysis shows that the express operation would save approximately 8 minutes, including dwell times. Ridership would increase for stations west of Raritan, but a similar amount of ridership would be lost due to reduce frequencies at the bypassed stations, some of which are among the heaviest ridership stations on the RVL. This analysis found that a bypass track may be warranted, but should be located further east on the RVL so that more riders can benefit from the travel time savings. Further investigations to determine an optimal bypass track location and service/station stopping plan are warranted. NJ TRANSIT anticipates conducting follow-on work for a third track on the RVL in 2011.

Additional Rail Services

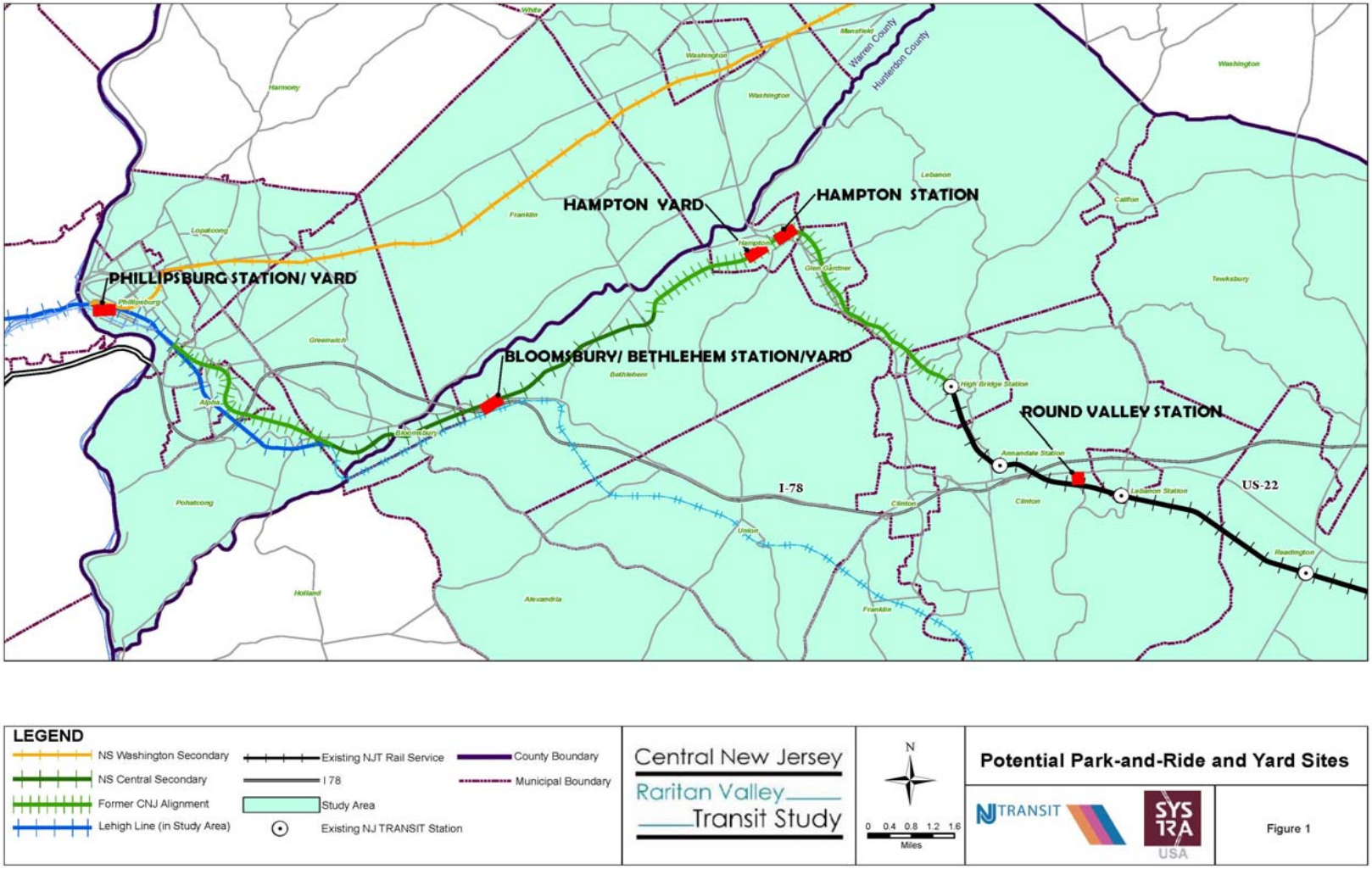
Requests have been made for additional rail service in the Study Area, which could be implemented without any rail extension and are independent of the shortlist alternatives.

These include the following Long List Alternative "Complementary Strategies":

- S18: Added RVL reverse peak service to Whitehouse, to support rail station shuttles with richer PM peak inbound service.
- S19: Weekend service extended to Whitehouse. Current RVL weekend service operates to and from Raritan.
- M6: Weekend M&E service to Hackettstown. Current M&E weekend service operates to and from Dover.

These additional services do not address the study's goal of reducing congestion on I-78 and therefore were not included in the short list of alternatives. However, they do address other goals outside of this study and are being evaluated by NJ TRANSIT.

Figure 5: Alternatives M28, L09, and L12/L13 Rail Alignments[6]



[6] Only one yard would be implemented and would be located at the terminal station.

Figure 6: Alternative S26 Parking Expansion Opportunities at Annandale Rail Station

Figure 7: Alternative M19 Parking Expansion Opportunity at High Bridge Station

Figure 8: Alternative M13 Hampton Park-and-Ride/Station (Rail)

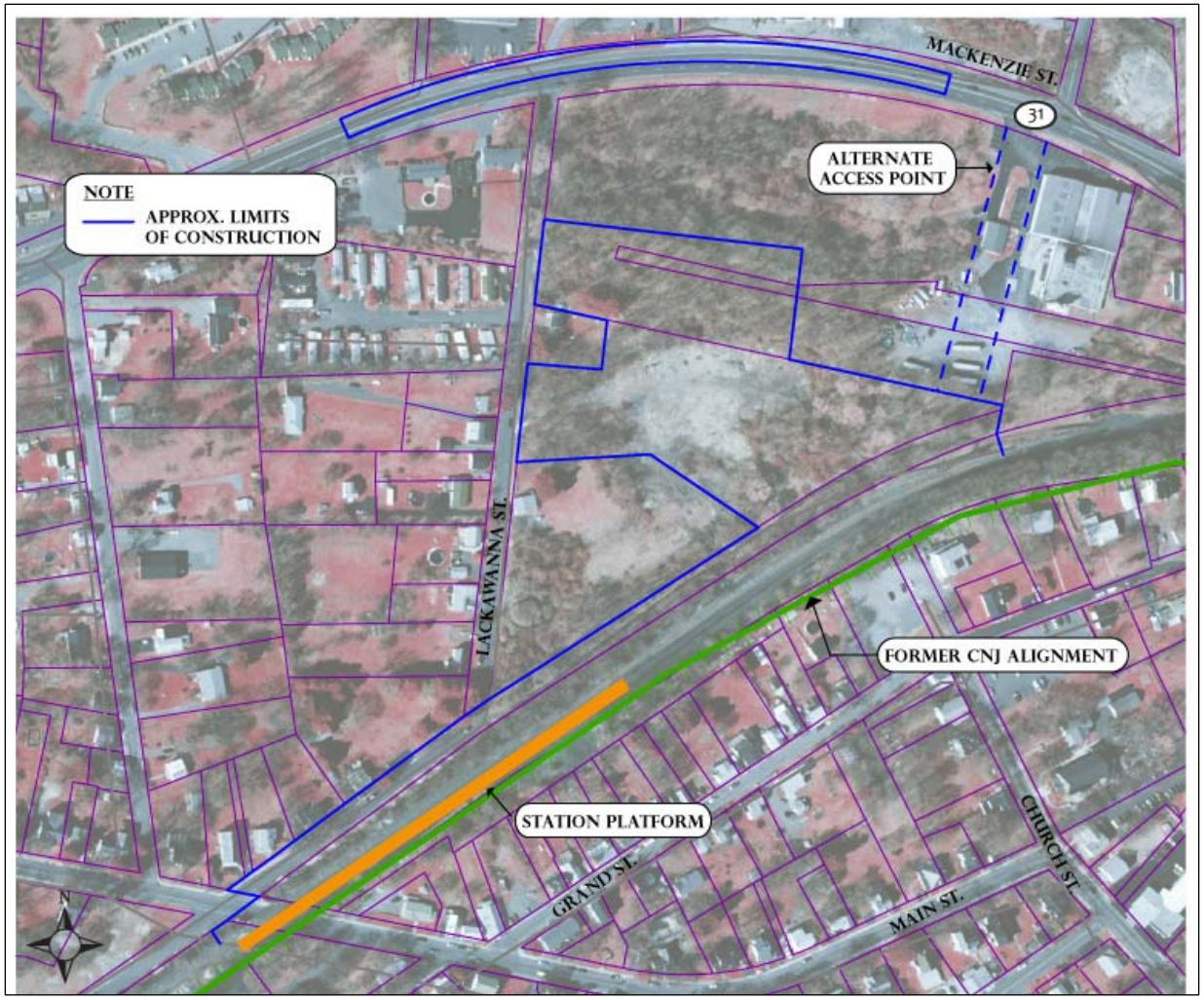


Figure 9: Alternative L19 Phillipsburg Park-and-Ride/Station (Rail)

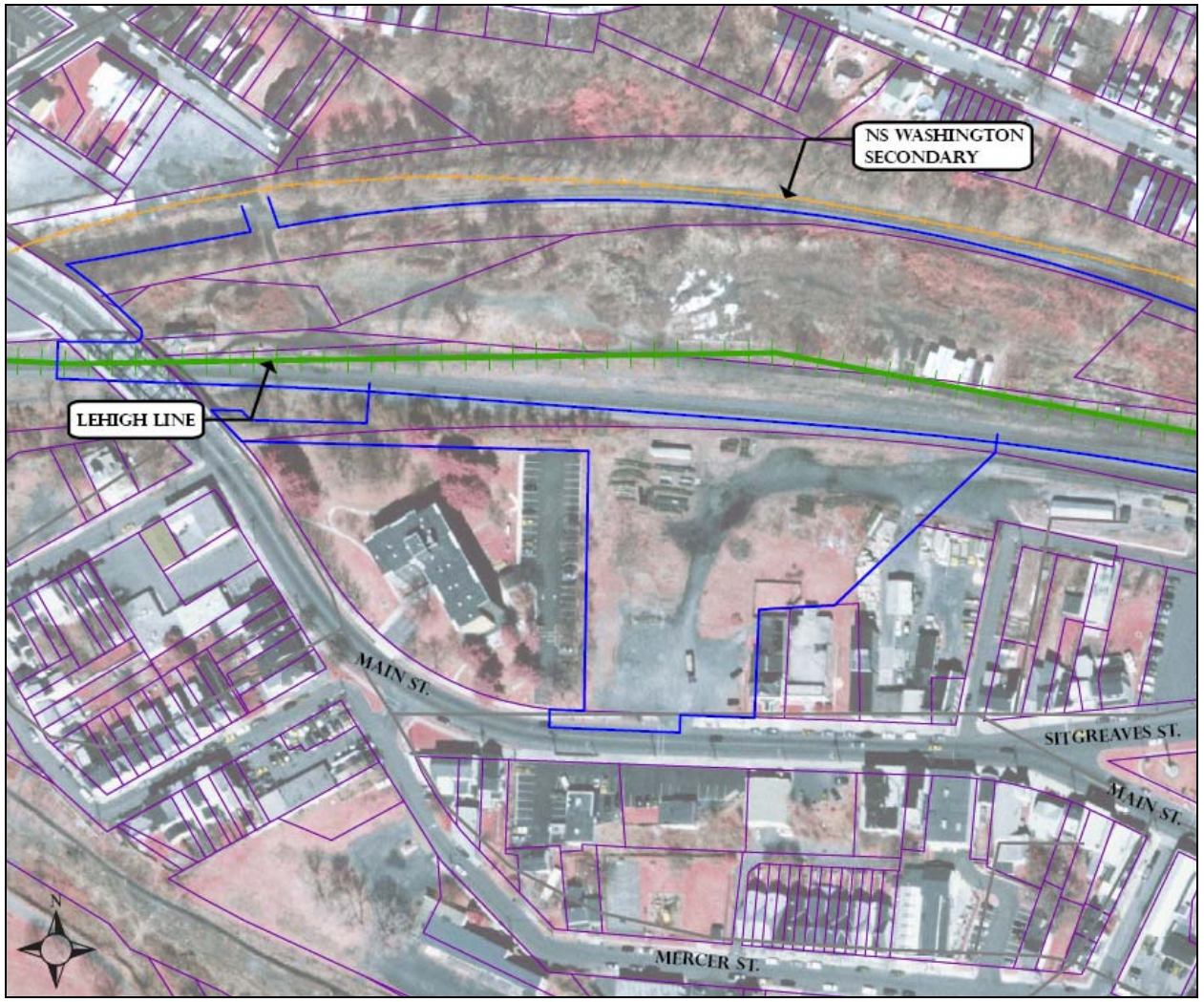


Figure 10: Alternative L09 Bethlehem Rail Yard

Figure 11: Alternative L12/L13 Phillipsburg Rail Yard

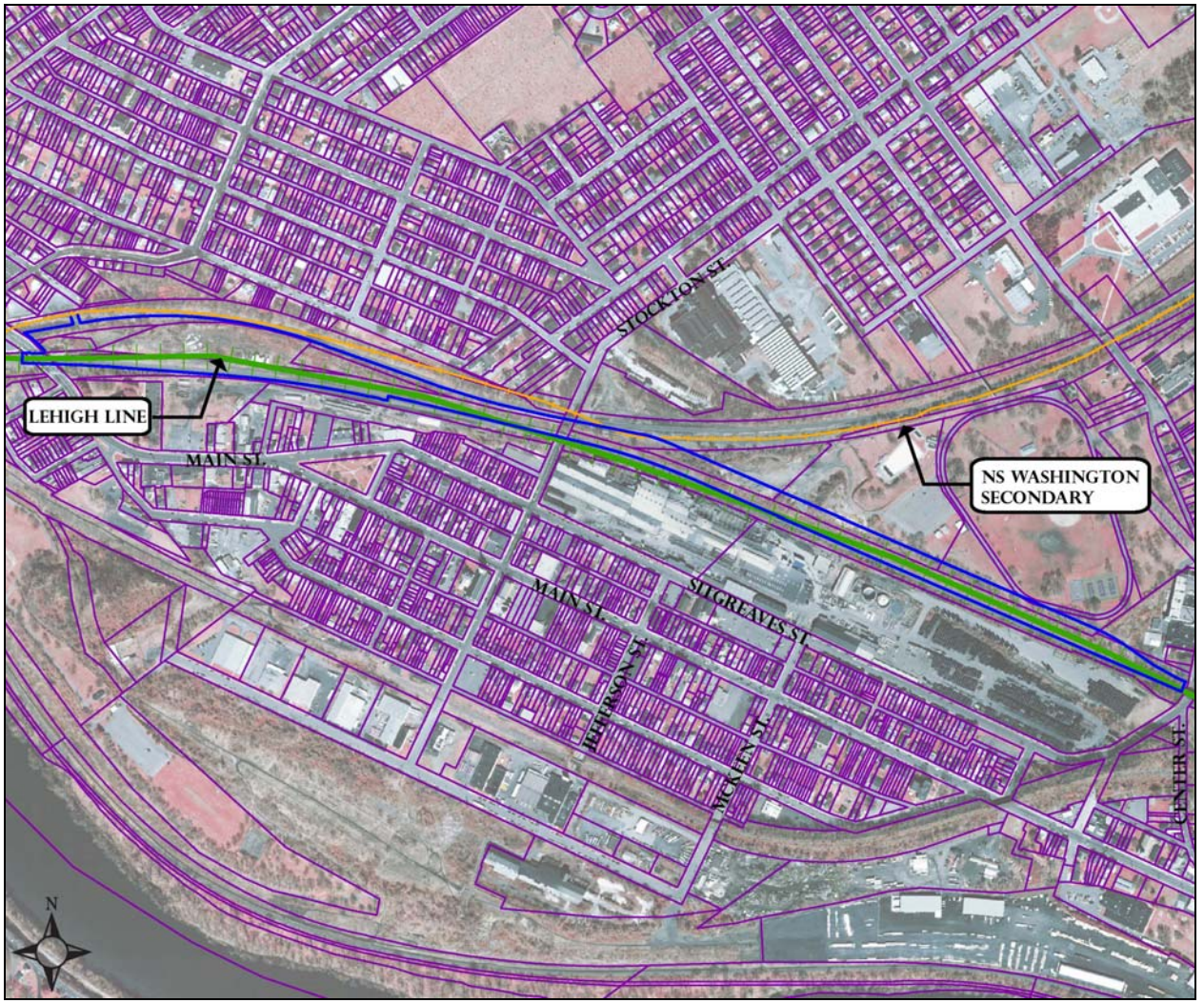
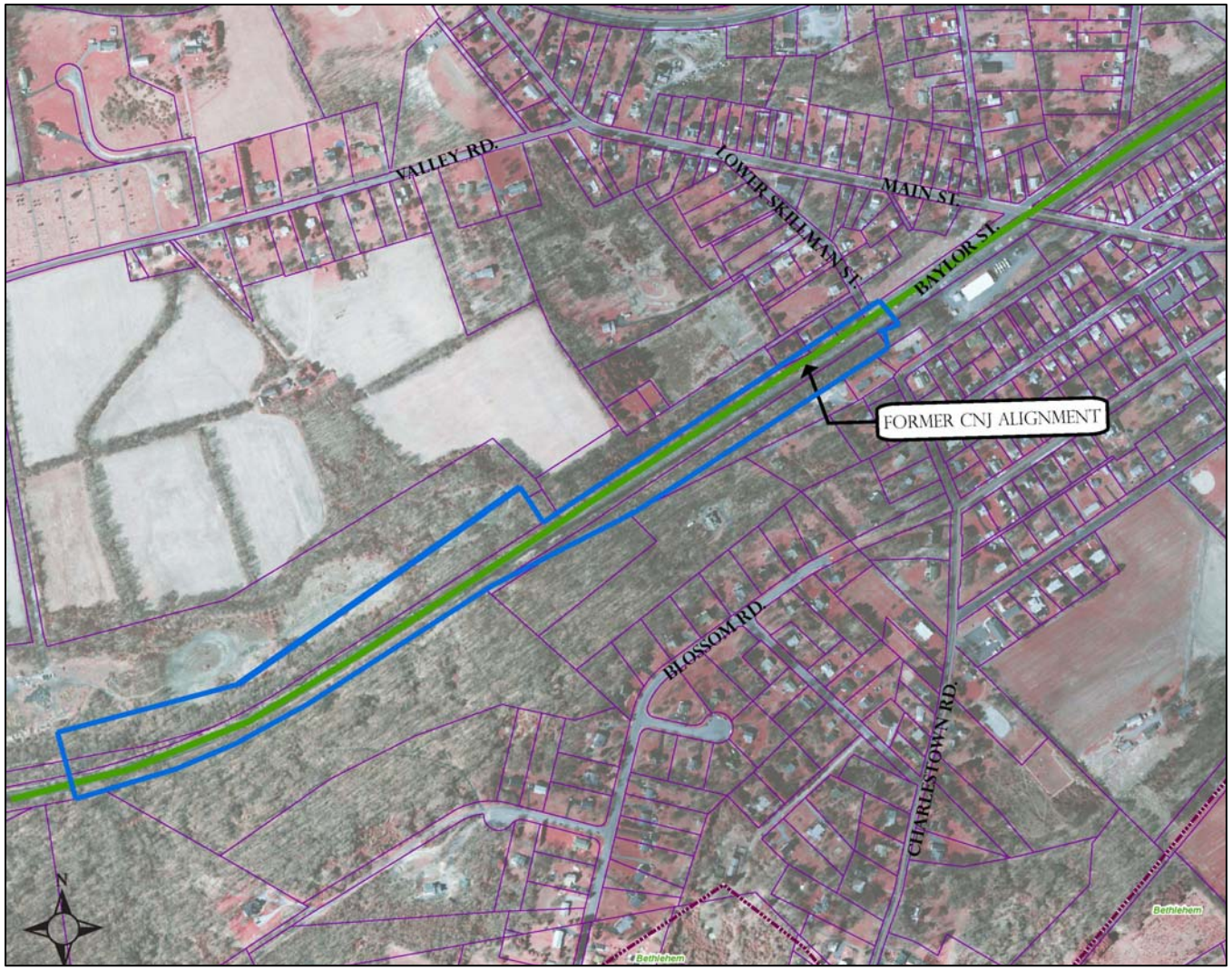


Figure 12: Alternative M28 Hampton Rail Yard



4. ENVIRONMENTAL ANALYSIS

4.1 Introduction

This section presents the results of the environmental screening analysis conducted to provide input into the alternatives definition and evaluation process. The environmental screening of the Long List Alternatives was conducted in October 2008 and documented in **Appendix D**. The environmental screening for the Short List alternatives was conducted in March 2009 and is documented in **Appendix J**.

Many of the proposed alternatives are located within the Highlands Region as designated under the New Jersey Highlands Protection Act (HPA). The New Jersey Department of Environmental Protection (DEP) is responsible for permitting under the HPA, while the Highlands Council is responsible for development and maintenance of the Highlands Protection Area Master Plan and associated land use policies. Coordination and permitting with these two agencies will be required for all rail extension and station site options.

The RVL extension has potential impacts to the Central New Jersey Railroad Mainline Historic District and the Lehigh Valley Railroad Historic District. Coordination with the New Jersey State Historic Preservation Office (NJSHPO) will be required for all rail extension and station site options. Additionally, the construction of parking facilities and rail stations would increase the impervious surface on each of the potential sites, therefore it will be necessary to develop stormwater runoff and drainage plans, in accordance with NJ DEP guidelines.

4.2 Environmental Screening Methodology

An environmental screening of the Long List of alternatives was conducted. Geographic Information System (GIS) mapping was created for each alternative, based on data layers provided by the Highlands Council, the NJ DEP, and federal mapping databases. Mapping was then used to conduct a macro-level evaluation to identify generally where the alternatives might interface with natural, social, and cultural resources of concern. Critical environmental resources were evaluated in terms of their general potential to be impacted by the construction or expansion of park-and-ride lots. In addition, a cursory review of site resources was conducted in the field. Environmental screening was conducted for the following critical resource areas:

- Highlands Land Protection Areas (e.g., Preservation areas or Planning areas)
- Highlands Land Use Capability Categories (e.g., Protection areas, Conservation areas, or Existing Communities)
- Water resources including wetlands, open bodies of water, floodplains, and streams, as well as their respective buffer areas
- Critical terrestrial and endangered habitats; record of presence of threatened and endangered species
- Historic and archaeological resources
- Reported contaminated/hazardous material, groundwater discharge, and surface water discharge sites
- Open space
- Air Quality

Environmental screening for the Short List alternatives took into consideration the Highlands Resource Areas (e.g., Preservation Areas and Planning Areas) as well as the Highlands Land Use Capabilities (e.g.,

Protection Areas, Conservation Areas, and Existing Communities). The Short-List screening took a more in-depth look at additional natural resources and determines whether further environmental investigation of resources would be required for each alternative, in later phases of this project. In addition to the critical resource areas included in the Long List screening, the Short List screening also considered the following critical resource areas:

- Agricultural Priority Areas
- Preserved Farmland
- Wetlands observed in the field and Wetland Protection Areas
- Forest Resource Areas
- Significant Natural Areas
- Steep Slopes
- Vernal Pools

A traffic impact analysis was conducted at the Round Valley, Hampton and – Bloomsbury/ Bethlehem sites. Details can be found in **Appendix J**.

4.3 Environmental Analysis Results

A summary of the environmental analysis for the Short List alternatives is presented in the following table. Technical memorandums documenting the environmental analyses can be found in **Appendix J**.

Table 8: Environmental Analysis Summary

Long List Alternative #	Significant Environmental Concerns	Permitting Strategy
M23 – Round Valley Station – Clinton Township	• Located entirely within a Highlands Planning Area and Conservation Area. Protection Area located in a small portion of the southwest corner of the site. • Western portion the site is located entirely within an Agricultural Priority Area. • Small area of wetlands near the southeast corner, adjacent to the former CNJ; possible wetlands on the southwest corner; NJ DEP may require a 50-foot wetland protection buffer around all delineated wetlands. • US 22 from I-78 to Cokesbury Road is congested today, and those conditions will worsen in the future irrespective of the proposed park-and-ride. Mitigation will be needed, and if completed would obviate the need for improvements in conjunction with the park-and-ride implementation.	• Subject to Highlands and federal permitting requirements for: Delineation of wetlands; Highlands permit application or permit waiver; and Coordination for formal determination of effect from NJ SHPO • This site may qualify for a Highlands waiver since it is not an exempt activity and not a redevelopment site.
M13 – Hampton Station, Hampton Boro	• Located entirely within Highlands Preservation Area and Existing Communities. • Located entirely within Agricultural Priority Area. • This site consists of vacant, forested land located within the Highlands Preservation Area, bordered by active, industrial land uses on two sides. • Possible wetlands and wetland areas throughout the site. Since this site is located within the Highlands Preservation Area, a 300-foot buffer would be required around all delineated wetlands. • Kappus Plastics Co., Inc., located adjacent to this site, has identified surface water discharge. • Route 31 carries moderately high traffic volumes during the morning and evening peak periods. Stop-sign controlled access to the proposed park-and-ride could operate reasonably well (LOS D or better). A traffic signal would be preferred, both to improve safety, to reduce delay, and to facilitate pedestrian crossings of Route 31.	• Subject to Highlands and federal permitting requirements for: Delineation of wetlands; Coordination with NJ DEP to determine the extent of surface water discharge from Kappus Plastics; Application for a Highlands permit or permit waiver; and Coordination for formal determination of effect from NJ SHPO • This site is not expected to qualify for an exemption from the Highlands Region permitting requirements. It is anticipated that a waiver would not apply to this site since all former rail infrastructure has been removed.

Long List Alternative #	Significant Environmental Concerns	Permitting Strategy
Hampton Yard; Hampton Boro	• Eastern portion of this site is located within an Agricultural Priority Area. • Entire site is located within and surrounded by a Forest Resource Area and critical habitat. • Western half of this site is located in a wetland protection area. • This site is located within and completely surrounded by critical habitat. • Preliminary mapping of environmental risk sites does not indicate that known contaminated sites exist on this site. However, due to the nature of the prior use as a coal storage facility, a preliminary site investigation should be conducted to determine the presence of environmental risks.	• Subject to Highlands and federal permitting requirements for: Coordination with NJ DEP and USFWS regarding critical habitat; Coordination with NJ DEP to determine presence of hazardous materials; Application for a Highlands permit or permit waiver; Coordination for formal determination of effect from NJ SHPO • This site is not expected to qualify for an exemption from the Highlands Region permitting requirements. Due to its location and prior use as a coal storage facility, this site may qualify for a waiver with redevelopment status.
M9 – Bloomsbury/ Bethlehem Station; Bethlehem Township	• Located entirely the Highlands Preservation Area and Highlands Conservation Area. • Located within an Agricultural Priority Area. • Critical Habitat borders this site to the north. • Small area of wetland protection area. • Wetlands observed in three different areas on this site based on the presence of wetland plant species • It is not known at this time whether the wetlands are isolated or part of a larger system. Since this site is located within Highlands Preservation Area, a 300-foot buffer would be required around all delineated wetlands. • Preliminary mapping of environmental risk sites does not indicate that known contaminated sites exist on this site. However, due to the nature of the existing use, a preliminary site investigation should be conducted to determine the presence of environmental risks. • The NJ Route 173 Bridge (historic) is located within close proximity to this site.	• Subject to Highlands and federal permitting requirements for: Coordination with NJ DEP and USFWS regarding critical habitat; Coordination with NJ DEP to determine presence of hazardous materials; Application for a Highlands permit or permit waiver; Coordination for formal determination of effect from NJ SHPO • This site is not expected to qualify for an exemption from the Highlands Region permitting requirements. However, there may be a basis for a request for a Highlands Region permit waiver with redevelopment status, since a portion of this site will be redeveloped for the station and parking facilities. In addition, as the site is currently used for transportation support services, it may be expected to qualify for a waiver on the basis of providing continued and essential transportation infrastructure.

Long List Alternative #	Significant Environmental Concerns	Permitting Strategy
Bloomsbury/ Bethlehem Yard; Bloomsbury Boro	• Located within Agricultural Priority Area. • Forest Resource Area forms the western boundary of this site. • Eastern half of site is located entirely within and is surrounded by critical habitat. • Wetland protection area covers the western half of the site. • The presence of environmental risks/hazardous materials on this site are not known at this time. • The NJ Route 173 Bridge (historic) is located within close proximity to this site.	• Subject to Highlands and federal permitting requirements for: Coordination with NJ DEP and USFWS regarding critical habitat; Coordination with NJ DEP to determine presence of hazardous materials; Application for a Highlands permit or permit waiver; Coordination for formal determination of effect from NJ SHPO • This site is not expected to qualify for an exemption from the Highlands Region permitting requirements. However, there may be a basis for a request for a Highlands Region permit waiver based on the purpose and need for the project and the essential nature of the proposed use of the site for transportation infrastructure for project success.
L19 – Phillipsburg Station, Phillipsburg	• Located in the Highlands Planning Area and Highlands Existing Communities. • This site falls within the Main Street Commercial Historic District.	• Subject to Highlands and federal permitting requirements for: Coordination for formal determination of effect from NJ SHPO
Phillipsburg Yard, Phillipsburg	• Located within Highlands Planning Area and Highlands Existing Communities. • A wetland is located just outside the site boundary; therefore, this site contains wetland protection areas through the western half of the site. • This includes the historic Center Street Bridge. • The presence of environmental risks/hazardous materials on this site are not known at this time. • This site would be located on or adjacent to publicly-owned parcels currently used as a swimming pool and recreation facilities.	• Subject to Highlands and federal permitting requirements for: Coordination with NJDEP to confirm the presence/absence of wetlands and modification of status as a wetland protection area; Coordination with NJ DEP to determine presence of hazardous materials; Coordination for formal determination of effect from NJ SHPO; Completion of a Section 4(f) evaluation

5. COST ESTIMATION

Capital and annual operating and maintenance costs were prepared for the shortlist alternatives. Costs are in 2009$ at the level of detail suitable for determining which alternatives are the most cost-effective and if the alternatives are cost effective enough to warrant further advancement. All costs are preliminary.

5.1 Cost Estimating Methodologies

5.1.1 Bus

Capital costs for the proposed commuter bus service were based on the service plan described in Section 3.5.1. Costs include buses necessary to operate the service but do not include additional garages or maintenance facilities, as the need for these is dependent upon the spare existing capacity of the selected operator. Capital costs for the rail station shuttles include the cost of buses necessary to operate the three routes described in Section 3.6.5 Vehicle costs were provided by NJ TRANSIT's Department of Bus Service Planning.

5.1.2 Rail

Capital costs for rail improvements were developed using take offs and unit prices based on prices used for prior NJ TRANSIT projects, adjusted for site-specific conditions and including escalation. Costs were developed using the Federal Transit Administration's Standardized Cost Category worksheets, which are located in **Appendix K**. A summary of cost estimation methods and significant assumptions for each of the Standard Cost categories is as follows:

Category 10: Guideway and Track Elements

Civil work and replacement of track elements and grade crossings are based on the construction scope as described in Section 3.6.2, and typical cross sections located in **Appendix H**. Ballasted track and concrete ties are included. Structures costs are based rehabilitation scopes developed from field inspections performed as part of this study, as well as replacement and new structure costs based on current unit pricing. Right-of-way is assumed to be fully available for construction activities, except for the NS Lehigh Line in Alternative L13, where allowances have been provided for working near an active freight railroad.

Category 20: Stations

The scope of all proposed station facilities is consistent with NJ TRANSIT's guidelines and applicable codes. Station platforms have grade separated and ADA-compliant access.

Category 30: Support Facilities

Overnight storage of trains at Yard facilities is included in this category. Maintenance of way facilities may be required but are not included. Yard costs are based on Bloomsbury Yard, which includes rolling stock storage, interior and exterior cleaning, fueling, sanding, inspection and running repair. It also includes electric propulsion and pantograph testing for the dual mode locomotives.

Category 40: Sitework and Special Conditions

This category contains allowances for utility relocation and protection, environmental mitigation, landscaping, and temporary facilities. It also includes station parking, including earthwork and stormwater retention and detention.

Category 50: Systems

Train control, and signals, communications and passenger fare collection systems are included. Backbone fiber optics is included to support NJ TRANSIT's current passenger information and fare collection systems, as described in Section 3.6.2.

Category 60: Right-of-Way

Property acquisition for yard and station facilities is included. A cost of $1,000,000 per acre is included that would include soft costs and any displacement and loss of business costs. Shared use proposals assume 50% of this per-acre cost.

Category 70: Vehicles

Rolling stock in the amount needed to carry the net new riders on the NJ TRANSIT commuter rail system is included. This could be adjusted in the future when specific equipment utilization plans are developed. Since proposed service plans as described in Section 3.6.1 are to extend already planned trains from High Bridge, and peak period bi-direction service utilizes fewer trainsets than is needed for unidirectional peak period service west of High Bridge, no costs for locomotives or additional trainsets is included.

Category 80: Professional Services

Engineering and design, project management, construction management and inspection, insurance, permits and jurisdictional reviews, start-up and testing, and Arts in transit are included in this category. Category 80 costs are approximately 34% of direct costs on average.

Category 90: Contingencies

Category 90 contains an unallocated contingency of 5%, considered as a project reserve. Allocated contingencies are included in each of the other categories, ranging from 15% to 25% of direct costs. Total contingencies are 34% on average.

Category 100: Financial

This category includes payment and performance bonds and guarantees.

5.1.3 Operating and Maintenance Costs Methodology – Bus

O&M costs for the proposed commuter bus service are based on the service plan described in Section 3.5.1. These costs were provided by NJ TRANSIT's department of bus service planning and reflect a generic operating cost for a private carrier in New Jersey. Actual operating costs will vary by operator, depending on labor costs, location of garage facilities and other factors. Total O&M costs reflect operating costs of $55 per vehicle revenue hour and maintenance costs $1.35 per vehicle revenue mile. Annual costs assume 255 days of operation per year.

O&M costs for the proposed rail station shuttles are based on the service plan described in Section 3.6.5. These costs were provided by NJ TRANSIT and reflect current cost of rail station shuttles supported by NJ Transit. Actual operating costs will vary by operator, and depend on that operator's labor costs, location of garage facilities and other factors. Total O&M costs reflect operating costs of $35 per vehicle revenue hour and maintenance costs $1.87 per vehicle revenue mile. Annual costs assume 255 days of operation per year.

5.1.4 Operating and Maintenance Cost Methodology – Rail

A resource build-up approach was used to develop O&M costs for the rail alternatives. This approach applies the projected unit costs for labor and materials to the amount of labor and materials necessary to perform the level of service. The output from the model is the total amount of labor and materials and the estimated cost.

The FTA-approved Access to the Region's Core O&M cost estimation model was used as the base model for this analysis. The model includes the following O&M categories: Train Operations, Train Maintenance, Maintenance of Way, Yard Operations and Maintenance, Station Operation and Maintenance, Revenue Collection, Access Fees, Utilities, Professional Service Contracts, and Administration.

The operating plan and assumptions described in Section 3.6.1 were used to develop operating statistics for each alternative. O&M statistics developed to feed the model included: train hours, car miles, equipment, track miles, yard miles, stations, and shared (freight) car miles. Revenues were estimated by NJ TRANSIT.

Detailed O&M cost information can be found in **Appendix K**.

5.2 Capital and O&M Costs Results

5.2.1 Capital Cost Results –Bus

The bus capital cost calculations can be found in **Tables 9** and **10**. For more detailed information, see **Appendix K**.

Table 9: Capital Costs – Shortlist Bus Services and Complementary Strategies

Alternative	Vehicles Needed for Service	Spare Vehicles Needed	Total Vehicles Needed	Cost per Vehicle	Total Capital Cost
S29: I-78 Commuter Bus to the Urban Core	9	2	11	$550,000	$6,050,000*
S03: Rail Station Shuttles	3	1	4	$80,000	$320,000
M02: I-78 Shoulder Running	N/A	N/A	N/A	N/A	$16,200,000

* Following historic policies regarding funding for commuter bus service in the study area, capital costs would be paid by NJ TRANSIT or the State of New Jersey in the proportion of New Jersey riders. If this policy is continued, 60.5% of the new bus ridership is forecast to board in New Jersey, and NJ TRANSIT would be responsible for $3,662,000 in commuter bus vehicle capital costs.

Table 10: Capital Costs – Shortlist Bus Park-and-Rides

Alternative	Parking Capacity*	Other Features	Total Capital Cost/Cost per Stall
Bloomsbury/ Bethlehem, First Phase – 150 stalls	150	Uses NJ DOT property only.	$1.6 million/ $10,500
Round Valley Access Road	240	Not costed separately, as site would host rail and bus. See **Table 11**	

* Based on maximum need scenario (see Section 3).

5.2.2 Capital Cost Results – Rail

Total rail capital costs in 2009$ can be found in **Table 11**. For more detailed information, see **Appendix K.** Costs are shown with and without rolling stock ($3.43 million per bi-level coach) and the storage yard ($59.3 million) to facilitate comparison with other projects.

Table 11: Capital Costs – Shortlist Rail Extensions and Stations

Existing Rail Stations					
Station	**Description**		**# Stalls**	**Total Capital Cost**	**Cost Stall**
Annandale	Expansion on NJT ROW		100	$1,050,000	$10,500
Annandale Vacant Parcel - 280 stalls	Vacant Parcel		280	$7,580,000	$27,100
Total – Annandale Station			380	$8,630,000	$22,700
High Bridge	Casa Maya Shared Use		50	$1,680,000	$33,600
New Rail Stations on Existing Commuter Rail Line					
Round Valley Access Road	Bus park-and-ride and Rail Station No off-site improvements are included With No RVL Extension or Extension to Hampton		600	$31,830,000	$53,050
	With RVL Extension to Bloomsbury/ Bethlehem or Phillipsburg		400	$29,750,000	$74,375
Rail Extensions including New Stations					
Alternative	**Route Miles**	**Stations (# stalls)/ Yard[7]**	**Vehicles**	**Total Capital Cost ($ mil.)**	**Cost per Route Mile ($ mil.)**
RVL Extension to Hampton	4.98	Hampton (195) Hampton Yard	4 bi-level coaches	$155	$31
		Without Rolling Stock		$144	$29
		Without Rolling Stock and Yard		$84	$17
RVL Extension to Bloomsbury/ Bethlehem	12.18	Hampton (195) Bloomsbury/ Bethlehem (2nd Phase only - 285) Bethlehem Yard	7 bi-level coaches	$235	$19
		Without Rolling Stock		$212	$17
		Without Rolling Stock and Yard		$152	$13
RVL Extension to Phillipsburg via CNJ	20.00	Hampton (195) Bloomsbury/ Bethlehem (2nd Phase only – 285) Phillipsburg (140) Phillipsburg Yard	7 bi-level coaches	$340	$17
		Without Rolling Stock		$317	$16
		Without Rolling Stock and Yard		$258	$13
RVL Extension to Phillipsburg via NS	20.00	Hampton (195) Bloomsbury/ Bethlehem (2nd Phase only - 285) Phillipsburg (140) Phillipsburg Yard	7 bi-level coaches	$305	$15
		Without Rolling Stock		$283	$14
		Without Rolling Stock and Yard		$224	$11

The RVL extension could be phased, as described in Section 3. Capital costs under phasing options are shown in 2009$ in **Table 12**. Three phasing scenarios are depicted in the table to illustrate the potential paths forward if a decision was made to advance a rail project at some time in the future. Additional

[7] A yard cost of $59 million is used in all alternatives, and is based on Bloomsbury/ Bethlehem Yard.

passing siding capacity beyond what has been proposed may be needed between yard and terminal locations to support non-revenue train movements.

Table 12: Capital Costs – Phased Implementation of Shortlist Rail Extensions

Phase	Route Miles	Stations/Yard	Vehicles	Total Capital Cost ($ mil.)	Cost per Route Mile ($ mil.)
Phasing Scenario A: 1st Phase to Hampton, 2nd Phase to Bloomsbury/Bethlehem, 3rd Phase to Phillipsburg					
Initial RVL Extension to Hampton	4.98	Hampton (195) Hampton Yard	4 bi-level coaches	$155	$31
		Without Rolling Stock		$144	$29
Second Phase RVL Extension Hampton to Bloomsbury/ Bethlehem Use Hampton Yard	7.20	Bloomsbury/ Bethlehem (2nd Phase only - 285)	3 bi-level coaches	$81	$11
		Without Rolling Stock		$68	$9
Third Phase RVL Extension Bloomsbury/ Bethlehem to Phillipsburg via CNJ Use Hampton Yard	7.82	Phillipsburg Station (140)	none	$105	$13
OR 3rd Phase RVL Extension Bloomsbury/ Bethlehem to Phillipsburg via NS Use Hampton Yard	7.82	Phillipsburg Station (140)	none	$71	$9
Phasing Scenario B: 1st Phase to Hampton, 2nd Phase to Phillipsburg					
Initial RVL Extension to Hampton	4.98	Hampton (195) Hampton Yard	4 bi-level coaches	$155	$3
		Without Rolling Stock		$144	$29
Second Phase RVL Extension Hampton to Phillipsburg via CNJ Use Hampton Yard	15.02	Bloomsbury/ Bethlehem (2nd Phase only - 285) Phillipsburg (140)	3 bi-level coaches	$187	$13
		Without Rolling Stock		$174	$12
OR Second Phase RVL Extension Hampton to Phillipsburg via NS Use Hampton Yard	15.02	Bloomsbury/ Bethlehem Station (2nd Phase only) Phillipsburg Station	3 bi-level coaches	$152	$10
		Without Rolling Stock		$139	$9
Phasing Scenario C: 1stPhase to Bloomsbury/ Bethlehem, 2nd Phase to Phillipsburg					
Initial RVL Extension to Bloomsbury/ Bethlehem	12.18	Hampton (195) Bloomsbury/ Bethlehem (2nd Phase only - 285) Bethlehem Yard	7 bi-level coaches	$236	$19
		Without Rolling Stock		$212	$17
Second Phase RVL Extension Bloomsbury/ Bethlehem to Phillipsburg via CNJ Use Bethlehem Yard	7.82	Phillipsburg (140)	none	$105	$13
		Without Rolling Stock		$105	$13
OR Second Phase RVL Extension Bloomsbury/ Bethlehem to Phillipsburg via NS Use Bethlehem Yard	7.82	Phillipsburg (140)	none	$71	$9
		Without Rolling Stock		$71	$9

5.2.3 Operating and Maintenance Cost Results – Bus

Bus O&M cost calculations can be found in the following table. For more detailed information, see **Appendix K**.

Table 13: O&M Cost – Bus Alternatives

	Annual Vehicle Revenue Hours	Operating Cost/Vehicle Revenue Hour	Total Annual Operating Cost	Annual Vehicle Revenue Miles	Maintenance Cost/Vehicle Revenue Mile	Total Annual Maintenance Cost	Total Annual O&M Cost (2009$)
Commuter Bus	12,249	$55	$673,695	450,761	$1.35	$608,527	$1,282,244
Rail Station Shuttles	1,904	$35	$66,640	42,840	$1.87	$80,111	$146,751

5.2.4 Operating and Maintenance Cost Results – Rail

Estimated annual O&M cost, revenue and farebox recovery for the rail extension alternatives is summarized in the following table. The annual O&M cost ranges from $11 million for the extension to Hampton to $14 million for the full extension to Phillipsburg. The most favorable farebox recovery ratio is 20% for the extension to Bloomsbury/Bethlehem. Detailed O&M back-up information can be found in **Appendix K**.

Table 14: O&M Costs – Rail Extension Alternatives

Alternative	Annual O&M Cost (million 2009$)	Annual Revenue (million 2009$)	Farebox Recovery (Extension only)
RVL Extension to Hampton	$11.00	$0.64	6%
RVL Extension to Bloomsbury/Bethlehem	$12.23	$2.50	20%
RVL Extension to Phillipsburg via CNJ	$13.71	$2.51	18%
RVL Extension to Phillipsburg via NS	$13.59	$2.51	18%

6. RIDERSHIP FORECASTS

6.1 No Build and Shortlist Alternatives

Ridership forecasts were developed using the expanded version of the North Jersey Travel Demand Forecasting Model (NJTDFM-ELV). This version expanded the FTA-approved NJTDFM to provide more detail in Lehigh and Northampton Counties and to include the most recent adopted demographic forecasts of the Lehigh Valley Planning Commission in addition to those prepared by the North Jersey Transportation Planning Authority. The updated methodology was reviewed and approved by the FTA. Details of the model characteristics, assumptions and ridership methodology are provided in **Appendix F**. All forecasts were conducted for the year 2030 with the following assumptions:

- Current fare policy
- Costs, including fares and auto operating costs, increase with inflation
- Gasoline cost $1.80/gallon
- Access to the Region's Core Final EIS rail service plan
- Free commuter parking within the study corridor

Ridership at new facilities was not constrained. Current parking facilities in the Clinton area are severely constrained. No parking expansion is possible at High Bridge Rail Station or Clinton Point bus park-and-ride. An expansion of approximately 75 parking spaces is possible at Annandale rail station, but is not assumed for the purposes of this analysis. The Round Valley Access Road site was used only for ridership estimation and demand testing purposes; no expansions at existing facilities were assumed.

In the No Build alternative, commuters will experience parking shortfalls in the Clinton area. This is most pronounced at Clinton Point park-and-ride, where 170 more spaces are needed by 2030.

Table 15: 2030 No Build Ridership and Parking Needs at Existing Facilities

Location	Parking Capacity	2030 Riders	Parking Spaces Needed	Parking Space Shortfall
Clinton Point	305	525	475	170
High Bridge	43	100	80	38
Annandale	75	265	215	140
Lebanon	15	20	15	0

In the Build scenarios, parking capacity is constrained to the totals depicted in the tables above. Where possible, excess parking demand would be shifted to existing and proposed facilities with available capacity. Where alternate facilities are not available, parking shortfalls remain.

Forecasts for new bus service were developed for two scenarios:

- New facilities at Bloomsbury/Bethlehem and Clinton Township (similar to Round Valley), with service as described in Section 3. This scenario assumes Annandale rail station is closed, with service stopping instead at Round Valley. The bus park-and-ride at Annandale Square is also closed, with all Wall Street and Jersey City bus service stopping at Round Valley instead. This scenario provides the maximum ridership of the Round Valley park-and-ride.

- New facility at Bloomsbury/Bethlehem only. New service described in Section 3 stops at Clinton Point instead of Annandale rail station and Annandale Square remain open. This scenario provides the maximum bus ridership of the Bloomsbury/ Bethlehem park-and-ride.

In the tested rail scenarios, it was assumed that additional bus service was already in place. Forecasts were developed for four rail scenarios. These scenarios consisted of the two bus scenarios each combined with rail service expansions terminating at Philipsburg and Bloomsbury /Bethlehem. Both expansion scenarios include a station in Hampton Borough.

Extending rail service to either Phillipsburg or Bloomsbury/Bethlehem generates approximately 1,400 year 2030 rail trips that are new to the rail system. Terminating service at Hampton generates approximately 750 new rail system trips. Up to 335 new bus trips would be generated by the year 2030 if no rail improvements were made.

6.2 Complementary Strategies

6.2.1 Bus Shoulder Running

The complementary strategy of bus shoulder lanes provides benefits to new and existing bus riders. Shoulder lanes speed up the trip along I-78 and induce approximately 100 new riders to utilize buses in this corridor:

Table 16: Daily Ridership Results – Bus Shoulder Lanes

Boarding Location	New Bus Riders due to Shoulder Lanes
Clinton Point or Round Valley	25
Bloomsbury/Bethlehem	35
Pennsylvania locations	40

6.2.2 RVL Express Operations

Providing express rail service by creating a third track along portions of the Raritan Valley Line has slight negative effect on total net ridership, as the additional ridership gained through faster service is offset by ridership lost at bypassed stations. Stations west of Raritan that benefit from faster service gain approximately 50 additional daily riders. At Raritan Station and further east, stations which lose some service due to express trains no longer stopping lose approximately 80 daily riders, largely at Raritan and Dunellen stations.

6.2.3 Rail Station Shuttles

Rail station shuttles from Raritan Station to major employers in the Bridgewater area yields approximately 25 total new rail riders at stations between Annandale and Phillipsburg. An additional 15 new riders are generated east of Plainfield, who use westbound RVL trains to reverse commute to major employers in the Bridgewater area. For full ridership details, see **Appendix G.**

Table 17: Daily Ridership – 2030 Bus Alternative

Location	No-Build					New Service at Bloomsbury/Bethlehem and Clinton Twp (Round Valley or similar)						New Service at Bloomsbury/Bethlehem Only					
	Bus Riders	Rail Riders	Total Riders	Parking Needed	Parking Shortfall	Bus Riders	Rail Riders	Total Riders	% Change from No-Build	Parking Needed	Parking Shortfall	Bus Riders	Rail Riders	Total Riders	% Change from No-Build	Parking Needed	Parking Shortfall
Clinton Point	525	---	525	475	170	335	---	335	-36%	305	0	430	---	430	-18%	390	40
Annandale Square	110	---	110	100	0	---	---	---	---	---	---	110	---	110	0%	100	0
Lebanon Rail	---	20	20	15	0	---	20	20	0%	15	0	---	20	20	0%	15	0
Clinton Twp	---	---	---	---	---	215	400	615	---	560	0	---	---	---	---	---	---
Annandale Rail	---	265	265	215	138	---	---	---	---	---	---	---	210	210	-20%	175	98
High Bridge Rail	---	100	100	80	38	---	55	55	-45%	43	0	---	85	85	-45%	70	25
Bloomsbury/ Bethlehem	---	---	---	---	---	65	---	65	---	60	0	213	---	213	---	195	---
TOTAL	635	385	1020	885	346	615	475	1090	7%	938	0	753	315	1068	2%	945	163

Without a new park-and-ride at Round Valley, most of excess ridership in the Clinton area will board further west at Bloomsbury/Bethlehem. However, some ridership will not be able to be accommodated. A shortfall of 138 parking spaces, which could serve 165 riders, is anticipated between Clinton Point and Annandale. These riders will drive, or leave the study area to board transit in Somerset County or further east. Unmet demand in the Clinton area will continue to result in parking facilities filling early in the morning peak.

Table 18: Daily Ridership – 2030 Bus and Rail to Phillipsburg

Location	No-Build					Rail service to Phillipsburg with new bus service at Bloomsbury/ Bethlehem and new bus and rail service at Round Valley						Rail service to Phillipsburg with new bus service at Bloomsbury/Bethlehem only					
	Bus Riders	**Rail Riders**	**Total Riders**	**Parking Needed**	**Parking Shortfall**	**Bus Riders**	**Rail Riders**	**Total Riders**	**% Change from No-Build**	**Parking Needed**	**Parking Shortfall**	**Bus Riders**	**Rail Riders**	**Total Riders**	**% Change from No-Build**	**Parking Needed**	**Parking Shortfall**
Clinton Point	525	---	525	475	170	335	---	335	-36%	305	0	370	---	370	-30%	340	35
Annandale Square	110	---	110	100	0	---	---	---	---	---	---	110	---	110	0%	100	0
Lebanon Rail	---	20	20	15	0	---	20	20	0%	15	0	---	20	20	0%	15	0
Round Valley	---	---	---	---	---	145	260	410	---	340	0	---	---	---	---	---	---
Annandale Rail	---	265	265	215	138	---	---	---	---	---	---	---	95	95	-39%	75	0
High Bridge Rail	---	100	100	80	38	---	65	---	-35%	45	0	---	55	55	-45%	43	0
Hampton	---	---	---	---	---	---	180	180	---	140	---	---	215	215	---	175	---
Bloomsbury/ Bethlehem	---	---	---	---	---	20	350	370	---	300	---	55	375	430	---	350	---
Phillipsburg	---	---	---	---	---	---	160	160	---	125	---	---	160	160	---	130	---
TOTAL	635	385	1,020	885	346	500	1,035	1,475	45%	1,270	0	535	920	1,455	43%	1,228	35

Table 19: 2030 Daily Ridership – Bus and Rail to Bloomsbury/ Bethlehem

Location	No-Build					Rail service to Bloomsbury/Bethlehem with new bus service at Bloomsbury/ Bethlehem and new bus and rail service at Round Valley						Rail service to Bloomsbury/Bethlehem with new bus service at Bloomsbury/Bethlehem only					
	Bus Riders	Rail Riders	Total Riders	Parking Needed	Parking Shortfall	Bus Riders	Rail Riders	Total Riders	% Change from No-Build	Parking Needed	Parking Shortfall	Bus Riders	Rail Riders	Total Riders	% Change from No-Build	Parking Needed	Parking Shortfall
Clinton Point	525	---	525	475	170	335	---	335	-36%	305	0	370	---	370	-30%	340	35
Annandale Square	110	---	110	100	0	---	---	---	---	---	---	110	---	110	0%	100	0
Lebanon Rail	---	20	20	15	0	---	20	20	0%	15	0	---	20	20	0%	15	0
Round Valley	---	---	---	---	---	145	260	410	---	340	0	---	---	---	---	---	---
Annandale Rail	---	265	265	215	138	---	---	---	---	---	---	---	95	95	-39%	75	0
High Bridge Rail	---	100	100	80	38	---	65	---	-35%	45	0	---	55	55	-45%	43	0
Hampton	---	---	---	---	---	---	180	180	---	140	---	---	215	215	---	195	---
Bloomsbury/ Bethlehem	---	---	---	---	---	20	500	520	---	420	---	55	525	570	---	575	---
TOTAL	635	385	1,020	885	346	500	1,025	1,465	44%	1,270	0	535	910	1,445	42%	1,228	35

Table 20: 2030 Daily Ridership – Bus and Rail to Hampton

Location	No-Build					Rail service to Hampton with new bus service at Bloomsbury/ Bethlehem and new bus and rail service at Round Valley						Rail service to Hampton with new bus service at Bloomsbury/Bethlehem only					
	Bus Riders	**Rail Riders**	**Total Riders**	**Parking Needed**	**Parking Shortfall**	**Bus Riders**	**Rail Riders**	**Total Riders**	**% Change from No-Build**	**Parking Needed**	**Parking Shortfall**	**Bus Riders**	**Rail Riders**	**Total Riders**	**% Change from No-Build**	**Parking Needed**	**Parking Shortfall**
Clinton Point	525	---	525	475	170	335	---	335	-36%	305	0	410	---	410	-16%	375	70
Annandale Square	110	---	110	100	0	---	---	---	---	---	---	110	---	110	0%	100	0
Lebanon Rail	---	20	20	15	0	---	20	20	0%	15	0	---	20	20	0%	15	0
Round Valley	---	---	---	---	---	145	400	545	---	450	0	---	---	---	---	---	---
Annandale Rail	---	265	265	215	138	---	---	---	---	---	---	---	205	205	-11%	165	91
High Bridge Rail	---	100	100	80	38	---	65	---	-35%	45	0	---	55	55	-45%	43	0
Hampton	---	---	---	---	---	---	180	180	---	140	---	---	215	215	---	195	---
Bloomsbury/ Bethlehem	---	---	---	---	---	20	---	20	---	20	---	55	---	55	---	50	---
TOTAL	635	385	1,020	885	346	500	665	1,085	6%	975	0	575	495	1,070	5%	943	161

7. FINDINGS AND NEXT STEPS

7.1 General Findings

As the Raritan Valley Line essentially parallels I-78 across New Jersey, NJ TRANSIT views the RVL as a transportation corridor of strategic importance. However, the RVL does not run in a straight line, but loops around the Musconetcong Mountains. In contrast, I-78 takes a more direct route from Annandale to Bloomsbury. Findings and areas of future work as are follows:

- The market for transit riders is primarily the Urban Core (see footnote 1).
- The less direct route of the railroad (approximately 3 miles longer than the highway), the 65-mph speed limit on I-78, and the likely intermediate point station stops (High Bridge and Hampton) means longer trip times on the RVL compared to buses that can take the more direct highway route.
- The study examined a possible long-term option for meeting the transit needs of the I-78/Rt 22/Rt 31 area with a new station in the area where the RVL crosses Route 22 in Clinton Township and east of High Bridge Station. However, no site has been found to be acceptable without an overall plan to mitigate area-wide traffic issues on Route 22 and it's confluence with other highways. A station in this location is potentially attractive to the larger catchment area, and would contain station-generated traffic circulation to major arterials. Several alternative sites have been investigated for a combined bus and rail facility that meets ridership needs over the long-term. This study identified a parcel adjacent to US 22 and the Round Valley Access Road which appears suitable for a combined bus/rail parking facility. However, US 22 in this area is forecasted to have increased traffic volumes in the future. The community is strongly opposed to development of this site as a park-and-ride, largely due to traffic it would generate.
- The study identified a number of potential small scale improvements to rail station parking in the corridor, in some cases by advancing concepts for shared use of existing parking facilities. Current projections for future demand suggest that localized smaller scale parking expansions be advanced on a case-by-case basis related to emerging local needs. These small-scale projects were not developed in detail as part of this project. North Branch, Whitehouse Station and Lebanon were identified as having potential for improvement.
- Bus service in this area is operated by private carriers, not NJ TRANSIT. Following past precedence, NJDOT would have primary responsibility for advancement of new bus park-rides and service alternatives since it is served solely by a private bus operator.
- Providing improved bus and rail transit in the Study Area will help mitigate traffic congestion on I-78. Prospective riders who cannot access transit in the Study Area will drive east through forecast congested areas of I-78 to access transit further east, or will drive to their destination.
- There is a market for increased bus services, linked to the provision of more appropriately situated park-and-ride capacity in New Jersey, and which has the interest of bus operators and communities in the Study Area.
- Options have been identified to address both bus and rail improvements. Along I-78, implementation is easier in the western part of the Study Area than the eastern part due to traffic congestion east of the I-78 Interchange 18, where Rt.. 22 merges with I-78 in the westbound direction. Highway congestion is forecast to worsen with or without the addition of park-and-ride capacity in this area.
- Ridership forecasts for the Study Area indicate that the extension of rail service will be comparatively expensive for the amount of ridership gained, and the percentage of fare revenues generated compared to operating costs is low.

- Employers and TMA's in the Study Area have interest in having employees take buses and trains as part of their commutes. However the diverse geography of the work force in the Study Area at both the residential and employer ends of work trips creates low ridership forecasts for either local bus service or rail station shuttles operated by NJ TRANSIT. Employer-sponsored rail station shuttles may be a promising option. Also, carpooling is a significant mode that fits the commutation patterns in the Study Area.
- Short term strategies to address current park-and-ride capacity shortage should be sought, as facilities today are oversubscribed.

Projects that could be advanced, subject to funding, are as follows, with consideration for the above-mentioned findings. Projects are presented by geographic area.

7.2 Confluence of I-78/Rt 22/Rt 31 Findings

Addressing the shortfall in park-and-ride capacity can be accomplished in several ways as noted below. The recommended strategy to mitigate park-and-ride demand in this area is to provide additional park-and-ride capacity further west along I-78. Additional capacity in the Rt. 31 corridor also has benefits, but to a lesser degree. Two options are available:

Add parking at Annandale and/or High Bridge Stations

- Limited opportunities for expansion at High Bridge are available. Significant opportunities exist at Annandale, but adjacent residential neighborhoods may be impacted by a significant increase in park-and-ride capacity, and so an expansion of only up to 100 spaces is recommended. If 150 spaces are added at the two stations, this part of the Study Area would still see some shortfalls in park-and-ride capacity, even if facilities were provided to the west on I-78.
- The locations of these two stations are away from I-78, and they are less attractive than the Round Valley site. In addition, they are not candidates for bus service.
- Expansion at Annandale could be done in the short term.
- A 150 space expansion at the two stations is estimated to cost $2.73 million in $ 2009, with no appreciable increase in NJ TRANSIT operating costs.

Construct a new rail station and bus park-and-ride at the Round Valley Access Road site[8]

- This project would allow for an ADA-compliant station facility meeting all of NJ TRANSIT's design standards. Sufficient property is available to meet all forecasted transit needs for the long term for this part of the Study Area. NJ TRANSIT would advance this improvement, in close consultation with Clinton Township.
- The existing Annandale Square Bus Park-and-ride would be relocated to Round Valley, and Annandale Station may be relocated to Round Valley. Clinton Point would remain as is.
- Traffic congestion on Route 22 needs to be reduced. The Route 22/I-78 interchange needs to be improved so that two westbound lanes on westbound Route 22 continue under Route 78 to

[8] The Round Valley site analyzed in the Short List is not preferred locally due primarily to forecasted traffic congestion on Route 22. Future analysis will require identification of traffic mitigation strategies, along with further review of alternate sites in this area.

Beaver Street. Also, forecasted levels of service between I-78 and Cokesbury Road need to be mitigated. Without mitigation, a bus operator may not be attracted to the site due to excessive 0ff-highway bus travel times. NJ DOT should advance this improvement.

- Other sites have been reviewed for a combined bus and rail station, and all would need these traffic improvements. These other sites are less preferred due to environmental impacts and/or increased costs.
- Without any rail extension, 560 stalls are needed to accommodate year 2030 demand. If rail is extended to Bloomsbury or Phillipsburg, 360 stalls would be needed. If extended to Hampton only, a smaller reduction of demand would result.
- The estimated capital cost for this project is $31.8 million in $2009. Because this station would be located along the RVL, no increase NJ TRANSIT operating costs will occur as long as the station is a relocation of, and not in addition to, Annandale Station.

7.3 Bloomsbury Area Findings

The Bloomsbury area near Interchange 7 is strategic in that a park-and-ride located in this area will both attract transit riders along the I-78 corridor as far west as the Lehigh Valley, and will somewhat reduce demand further east in the I-78/Rt 22/Rt 31 Confluence Area. Ridership studies have shown that a bus park-and-ride further west in the Alpha area is not needed, as riders would be attracted to this site by the convenience of I-78. One park-and-ride site has been identified as preferred for a short term bus park-and-ride and potential future rail station.

Construct a bus park-and-ride at the NJ DOT maintenance facility in Bethlehem, near the Bloomsbury Borough border.

- A park-and-ride can be developed on NJ DOT property for up 150 spaces, without any off-site improvements needed. The site is constrained to this capacity. To meet full demand, 50 additional spaces are needed, which could be obtained by rearranging NJ DOT facilities, if possible.
- If Round Valley is implemented for bus service, only 45 spaces would be needed.
- This site requires bus operations off of I-78, and may not be attractive for bus operators and their on-board customers to divert off of I-78. The site is too small for a bus route start location. The attractiveness of the site to bus operators given these parameters needs to be confirmed.
- As this facility would be served by private carriers, the implementation of this project would be by NJ DOT, with NJ TRANSIT coordination in developing the future rail station. Bethlehem Township should also be involved.
- The estimated capital cost for this project is $1.57 million in $2009. This site could be developed in the short term as no property acquisition is needed, with a more easterly project implemented in a longer time frame. This phasing strategy would alleviate oversubscription at this site towards the year 2030.

Develop a Bloomsbury/Bethlehem Rail Station at this site

- If rail service is extended to Bloomsbury, a rail station could be implemented on the bus park-and-ride site. The constraints of the site will limit the capacity so that complete ridership needs are not met if rail was extended to Bloomsbury, but would be met if rail was extended to Phillipsburg.
- Extending service to Bloomsbury/Bethlehem will attract new riders from the I-78 corridor. Therefore excess demand in Clinton area will be reduced by 220 stalls. To meet year 2030 demand, 275 stalls

are needed assuming Round Valley is implemented, and 445 to 575 stall are need here without Round Valley, depending on rail service terminating in Phillipsburg or at this station, respectively.

- While the site can accommodate 450 stalls in total without significant earthwork or NJ DOT facility relocation costs, year 2030 demand requires 445 stalls if rail is extended to Phillipsburg, and 575 stalls is rail terminates at this site.
- The capital cost of this improvement is included with the rail extension project.

7.4 Route 31 Corridor Findings

Bus service is not warranted due to low ridership and the difficult in attracting an operator because of significant deadheading time. However a rail station at Hampton is warranted if a rail extension is implemented. Adding a station at Glen Gardner is not justified. One option has been identified:

Construct a rail station in Hampton, near Rt. 31

- Extending service to Hampton will attract new riders from the Route 31 corridor, but not the I-78 corridor. Therefore excess demand in Clinton area will not be significantly alleviated. To meet year 2030 demand, 195 stalls are needed assuming Round Valley is not implemented and rail service is extended to either Bloomsbury/Bethlehem or Phillipsburg. Expansions at High Bridge and/or Annandale will reduce the need at Hampton, and implementing Round Valley will reduce the need at Hampton more so, by 55 stalls.
- While the station would be accessible from a walk up market made of up residential neighborhoods in Hampton, developing a park-and-ride site could be challenging due to intersection improvements and the need for a new traffic signal on Rt. 31. Also, the park-and-ride site has the highest level of Highlands Council preservation.
- Placing a station within walking distance of Hampton Borough residential neighborhood in consistent with State of New Jersey and Highlands Council smart growth strategies. Further discussions with the Highlands Council are needed in light of the competing interests for open space preservation and smart growth development. Hampton Borough should also be consulted.
- The park-and-ride site is constrained due to on-site wetlands. The needed capacity appears to be obtainable, subject to further wetlands delineation studies.
- Ridership studies have found that excess High Bridge riders would use Round Valley, but a second option would be Hampton for some of those riders.
- The capital cost of this improvement is included with the rail extension project. The station would only be implemented with the rail extension making it a medium or long term project (over 5 years to implement).
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7.5 Rail Extension Options Findings

Extend rail service to Hampton

- Hampton Yard is the easternmost site along the RVL extension suitable for a yard location large enough to accommodate the required storage yard program for eight trainsets. An extension to Hampton with the yard would provide the needed additional yard capacity to operate the proposed year 2030 RVL service plan.

- The right-of-way to be used is owned by NJ TRANSIT and would have a low level of environmental challenge.
- Farebox recovery is poor at 6%, considering ridership, revenues and operating costs for the extension.
- Capital costs are $157 million, including rolling stock and the Hampton Yard, and could be implemented in under 10 years. This project could be a first phase of an extension further west.

Extend rail service to Bloomsbury/Bethlehem

- Bethlehem Yard is at a location large enough to accommodate the required storage yard program for eight trainsets. An extension to Bloomsbury with the yard would provide the needed additional yard capacity to operate the proposed year 2030 RVL service plan.
- The right-of-way to be used is owned by NJ TRANSIT and would have a low level of environmental challenge. NS trackage rights would not interfere with passenger operations.
- Farebox recovery is the best of the three rail extension options, at 20%.
- Capital costs are $236 million, including rolling stock and the Bethlehem Yard, and would be implemented in the long term, over 10 years. This project could be a first phase of an overall extension to Phillipsburg or a second phase of a project that initially extended the RVL to Hampton.

Extend rail service to Phillipsburg

- Phillipsburg Station would be located near the Phillipsburg downtown, and would draw from a nearby residential market as well as regionally. To meet year 2030 demand, 140 stalls are needed.
- Phillipsburg Yard is in a constrained location that allows only for an inefficient layout of yard functions and storage for 8 trainsets off of main tracks. Also, a small amount of Green Acres encumbered property is needed.
- Of the two options for the alignment between Bloomsbury and Phillipsburg, using NS would be less costly to construct. Operating costs are similar, in that access fees for using NS are equivalent to maintenance of way costs for staying on the former CNJ Main Line. Further discussions with NS are needed to determine the specific requirements for using NS right-of-way.
- Route length and travel times are nearly identical for the two route options. Reinstitution of service on the former CNJ right-of-way would have a low level of environmental challenge. NS trackage rights where there is freight activity would not interfere with passenger operations.
- Farebox recovery is nearly as good as the extension to Bloomsbury/Bethlehem, at 18%.
- Capital costs are $342 million using the former CNJ Main Line, and $307 million using the NS Lehigh Line, including rolling stock and the Phillipsburg Yard, and would be implemented in the long term, over 10 years. This project could be a second or third phase of a project that initially extended the RVL to Hampton and/or Bloomsbury/Bethlehem.

7.6 Complementary Conditions Findings

There are a number of complementary conditions that help to justify making an investment in expanding transit services. NJ TRANSIT and regional leaders will need to monitor these conditions to determine the appropriate time for advancing any of the transit improvements highlighted in this report. These conditions include:

- development of complementary land uses
- clustering of development

- development of sustainable markets to support transit services
- partnerships with local and regional bodies to provide lower density shuttle type services

Recommendations on which projects to pursue and fund need to be made in further consultation with local officials, regional and State agencies and other stakeholders using the data and information developed in this project. Given current fiscal realities, it will be imperative for NJDOT, NJ TRANSIT, Private Bus Operators, area TMAs, Counties and Municipalities to partner cooperatively to find creative solutions to transportation challenges in this strategic corridor. Key areas of future work would include:

- Roadway improvements - including Route 22/78 ramp improvements and potential bus use of I-78 shoulder.

- Bus park-and-ride improvements - in addition to the sites discussed in this report, the Township of Clinton has suggested a potential site for a new bus-only park-and-ride, located along Route 31 south of I-78. NJDOT, Clinton Township and the private bus operator serving this region can pursue this as a replacement for the temporary Annandale Square facility.

- Rail improvements - including potential station & park-and-ride improvements, further review of extension possibilities, and analysis of potential improvements to the existing RVL to enhance capacity and permit faster rail service.

- Counties and TMAs can play an important role in advancing projects by building consensus with their constituents. They can also work with businesses and communities to help develop lower density transit options in this region (shared ride, van pool, minibus etc.)

- Interested local municipalities can work with NJ TRANSIT on land uses and transit oriented development opportunities (to the extent these are consistent with regional planning context such as the Highlands Act) to support increased transit usage in the future.

- Also, express rail trips that would skip large numbers of stops on the eastern part of the RVL are not currently possible because the RVL consists of only two tracks east of the study area, with both tracks being needed for the existing bidirectional service. Substantial capital investment would be needed to add the capacity required for an express service.

Rail service west of Raritan has traditionally been of lower volume than the service east of that point, and "west of Raritan" service has had a varied history. The traditional endpoint for "commuter" service in this outer zone was Hampton. Service to Phillipsburg was provided by the limited number of intercity trains (to Allentown and/or Harrisburg). In 1967, the intercity service was discontinued and Hampton became the "end of the line". In 1974 New Jersey provided funding to extend service as far west as Phillipsburg. Ridership was very low (less than 50 daily boardings combined at the three stations west of High Bridge), and in 1983 NJ TRANSIT truncated the west of Raritan service at High Bridge. Trains are stored overnight at Raritan Yard and "deadhead" to/from High Bridge. NJ TRANSIT also came to an agreement with TransBridge lines, a local private bus company, to coordinate bus services in the I-78 Corridor. NJ TRANSIT transferred all of its former bus service west of Clinton to TransBridge, with NJ TRANSIT providing the local service east of Clinton.

Future consideration of expansion/improvement of transit services to the Study Area would benefit from some local actions that would support transit, especially including changes to local land use plans that would encourage clustering of development around the transit stations, and new partnerships between NJ

TRANSIT, local governments and other transit operators that would create partnerships for sustaining the services. Transit services, especially rail services, require concentrations of origins and destinations to generate enough ridership. Current land use in the RVL area tends to disperse development, making it harder to serve with traditional fixed route and scheduled transit service. Equally important are the availability of parking at station and/or the provision of feeder transit services so travelers can access the service.

New partnerships are needed between NJ TRANSIT, local governments, residents, business, and other transit providers, like Transportation Management Associations (TMAs), to make transit work. The current Raritan Valley Line has some capacity constraints that limit the quality of service that can be offered. NJ TRANSIT will be further investigating potential improvements to address these limitations, which affect the 21,000 existing daily riders as well as any new riders attracted by potential extensions. Improvements to be investigated include:

- Hunter Flyover (a grade separation allowing eastbound RVL trains to cross above the Northeast Corridor and enter NEC Track One);
- Lehigh Line improvements, including additional parallel trackage along a 6-mile segment of Conrail's Lehigh Line in Essex and Union Counties (used by approximately 60 daily RVL trains and 40 daily freight trains)
- RVL third track – addition of a third track to a section of the RVL allowing for future overtake/express service.