Delmarva Intercity Rail Feasibility Study

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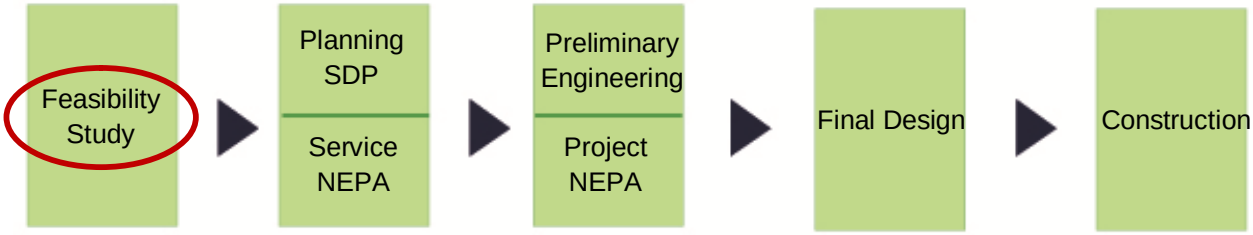
Executive Summary

The States of Delaware and Maryland are interested in investigating the potential for re-establishing passenger rail service on the Delmarva Peninsula. The proposed passenger rail service under consideration would operate along existing freight lines owned by Norfolk Southern Corporation (NS) and the Maryland and Delaware Railroad (MDDE). To be eligible for federal funding for the proposed service, the Delaware Department of Transportation (DelDOT) and Maryland Department of Transportation (MDOT) are required by the Federal Railroad Administration (FRA) to develop a Passenger Rail Corridor Investment Program, illustrated in Figure E-1. Typically, the first of several steps is the preparation of a Service Development Plan (SDP). The SDP can be developed in parallel with a corridor-level environmental analysis (Service NEPA) or sequentially, with funding considerations typically the deciding factor.

Figure E-1 FRA Passenger Rail Corridor Investment Program Steps



In a number of instances, states have elected to prepare feasibility analyses prior to the development of the SDP. By conducting an initial feasibility analysis, a state can determine whether a proposed service is viable prior to the state investing in the preparation of the more expansive SDP. The States of Delaware and Maryland decided to use a mixed approach to investigate the potential for Delmarva intercity passenger rail service by preparing a feasibility assessment that can readily be expanded into a SDP.

History of Passenger Rail Service on the Delmarva Peninsula

During the height of the railroads in America, both freight and passenger rail service created prosperity for the Delmarva region. The rail connection in 1856 made Seaford a prosperous town, with easy connections to the northeastern United States and to the Chesapeake Bay. By 1868, the rails had reached Georgetown. With the extension of the railway to Lewes the following year, and the addition of connections to the Rehoboth resort and the lower Eastern Shore in the 1870s, the Delmarva Peninsula experienced a period of unprecedented prosperity. Located at the hub of this network, Georgetown was transformed by a growing population and booming economy. The town's first passenger station was built in the 1860s.[1] By the 1880s, a steady increase in the number of travelers resulted in the need for a newer and larger facility.

[1] http://www.georgetowntrainstation.org/TrainStationHIstory.htm

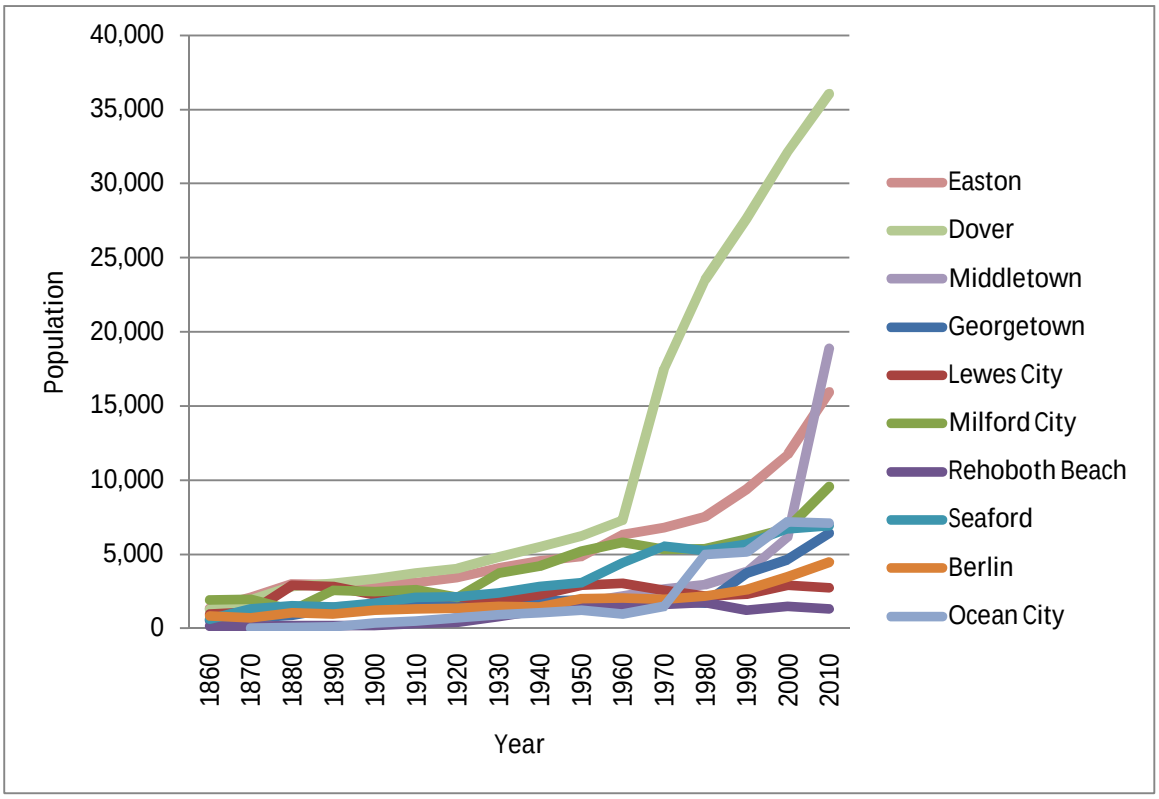
Freight service remained in Delmarva and continues today. The Delmarva rail lines, along with others of the Pennsylvania Railroad, became part of the merged Penn Central Transportation Company in 1968. Penn Central declared bankruptcy two years later in 1970, but continued to operate in receivership until April 1, 1976 when it was consolidated with the other bankrupt Northeast railroads into a new enterprise called Consolidated Rail Corporation (Conrail). The newly created Conrail included the lines from Newark, DE, to Cape Charles, VA, and from Harrington to Frankford, DE. The remaining branch lines were not in Conrail's Final System Plan and so they were transferred to a new shortline: the Maryland and Delaware Railroad Company (MDDE).[2] The Smyrna – Oxford branch was then abandoned. In 1999, Conrail was dissolved and its assets sold to CSX and Norfolk Southern (NS) or became part of the Conrail Shared Assets Operations. Both freight main lines, the Delmarva Secondary and the Indian River Secondary in Delmarva, now belong to NS and are being considered for the proposed service.

Purpose and Need

Population growth in the region has accelerated in recent decades, especially in Dover, Milford, Middletown, Ocean City, Berlin, and Easton, as illustrated in Figure E-2. Rising population in suburban developments, such as those on the Delmarva, will continue to increase traffic and congestion on local roads. The continued development of resort communities along the coast also adds to the burden of local roads; although the beach towns support a few thousand residents year round they can host tens of thousands of visitors during the peak season.

[2] http://www.mdde.com/history.html

Figure E-2 Historic Population Growth in Delmarva



Source: US Census 2010

The number of year round residents is expected to continue to grow rapidly. Since 2000, the population of Sussex County has increased by over 25 percent and is predicted to be nearly double the 2000 population by 2040. With many people retiring to the resort areas in Sussex County, approximately 32 percent of the 2040 population in Sussex County is projected to be 65 or older. As driving may become more difficult, providing opportunities for alternative travel modes for an aging population is important for the anticipated growth in the region.

The population of the Eastern Shore of Maryland, which consists of Dorchester, Somerset, Wicomico, and Worcester Counties, is also growing. Berlin and Ocean City, potential termini of the proposed rail service are both located in Worcester County. The Eastern Shore is projected to grow nearly 50 percent from its 2000 population of 186,608 to 256,100 by 2040. Worcester County itself is projected to grow 38 percent by 2040.

Adding to the mobility needs of a growing population is the visitor-generated demand for transportation; an estimated six million visitors travel to coastal Delaware[3] each year and an estimated

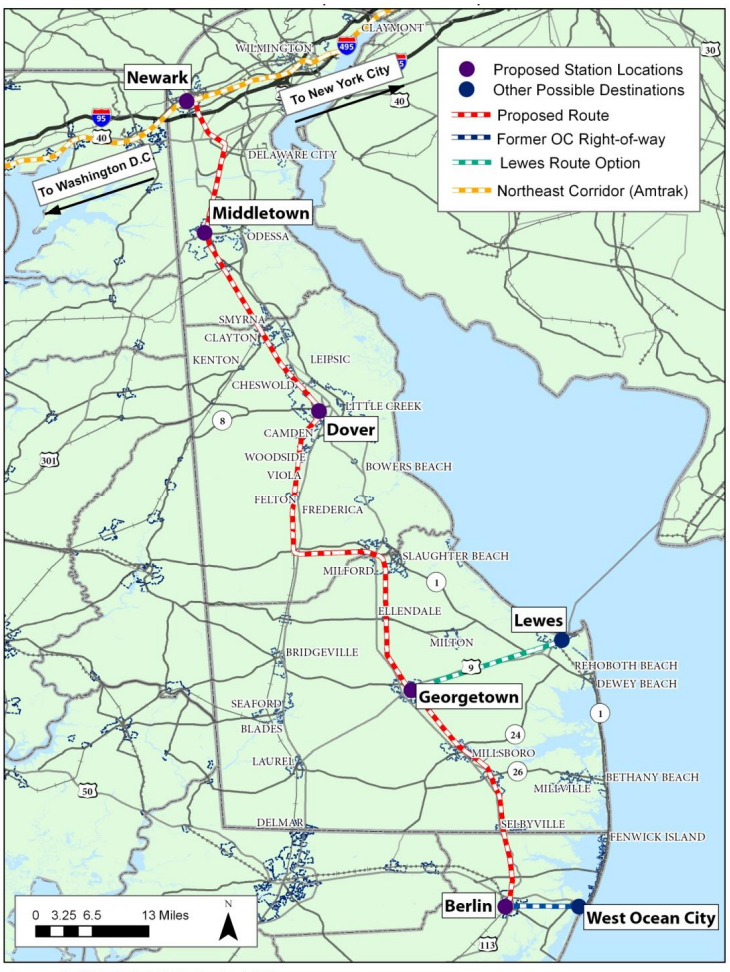
[3] http://www.dnrec.state.de.us/dnrec2000/Beaches.htm

eight million travel to Ocean City, Maryland.[4] This generates a significant amount of intercity traffic, especially in the summer months.

More than 21 percent of visitors to coastal Delaware are from Pennsylvania, and another 29 percent are from New Jersey and New York. Another important origin point is South Central Pennsylvania, the "HLLY" (Harrisburg, Lancaster, Lebanon, and York) region.[5] Notably, the 50 percent of visitors to Delaware beaches from New York, New Jersey, and Pennsylvania are already connected to the Amtrak rail network on the Northeast Corridor and the Keystone Line. Completing the Wilmington-Delmarva train link could prove to be an important and effective means of increasing travel from these areas. This is also true of the visitors from Maryland and Virginia along Amtrak's Northeast Corridor line. As the travel to these areas increases, roadway congestion will worsen especially in the summer months.

Identification of Alternatives

Figure E-3 Delmarva Intercity Passenger Rail Route - Delmarva Segment



Sources: DelDOT, FRA, FHWA, Maryland SHA

[4] Ocean City Convention and Tourism <http://ococean.com/media>
[5] Ocean City Convention and Tourism

Although a single alignment down the spine of the Delmarva was identified for the service, 21 different service alternatives were developed reflecting Delmarva terminus, service frequency, target NEC market, time of day, and other scheduling features. All but one option had its Delmarva terminus in either Berlin, Maryland or West Ocean City, Maryland. The exception incorporated Lewes, Delaware as the end of the line.

Figure E-4 outlines each alternative. All options include Newark. Options with four stations include Middletown, Dover, Georgetown, and Berlin; options with five stations extend beyond Berlin to West Ocean City. The Lewes terminus option includes Middletown, Dover, Georgetown, and Lewes. Trains per day is the number of trains each day in all directions - four trains, for example, represents two inbound and two outbound trains.

Figure E-4 Rail Alternatives

Option	Service (Delmarva Departure Times)	One-Way Trains per Day	Service Category	Stations	WAS Trains	NYP Trains	Average Travel Time WAS	Average Travel Time NYP
Weekend 1A Berlin	1RT/day to NYP (5:30am)+ 1RT/day from NYP (3pm) + 1RT to WAS (7am)	6	Weekend	4	2	4	3:50	4:38
Weekend 1B WOC	1RT/day to NYP (5:30am)+ 1RT/day from NYP (3pm) + 1RT to WAS (7am)	6	Weekend	5	2	4	3:58	4:46
Weekend 1C (Fri-Sun)	1x/day to NYP (4:30pm)	2	Weekend	4	0	2	4:26(a)	4:38
1A Berlin	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	6	High	4	2	4	3:50	4:38
1B WOC	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	6	High	5	2	4	3:58	4:46
2A Berlin	1RT/day to WAS (6:30am)	2	Low	4	2	0	3:50	4:45(a)
2B WOC	1RT/day to WAS (6:30am)	2	Low	5	2	0	3:58	4:53(a)
3A Berlin	1RT/day to NYP (5:30am)	2	Low	4	0	2	4:26(a)	4:38
3B WOC	1RT/day to NYP (5:30am)	2	Low	5	0	2	4:34(a)	4:46
4A Berlin	1RT/day to NYP (5:30am) + 1RT/day to WAS (9:30am)	4	Medium	4	2	2	3:50	4:38
4B WOC	1RT/day to NYP (5:30am) + 1RT/day to WAS (9:30am)	4	Medium	5	2	2	3:58	4:46

Option	Service (Delmarva Departure Times)	One-Way Trains per Day	Service Category	Stations	WAS Trains	NYP Trains	Average Travel Time WAS	Average Travel Time NYP
5	1RT/day to LEWES TO NYP/WAS (6am; 7am)	4	Medium	Lewes	2	2	3:31	4:11
6A Berlin	1RT/day to WAS (10am)	2	Low	4	2	0	3:50	4:55
6B WOC	1RT/day to WAS (10am)	2	Low	5	2	0	3:58	5:03
7A Berlin	1RT/day to NYP (9:30am)	2	Low	4	0	2	4:28(a)	4:38
7B WOC	1RT/day to NYP (9:30am)	2	Low	5	0	2	4:36(a)	4:46
8A Berlin	1RT/day to WAS (4pm)	2	Low	4	2	0	3:50	4:45(a)
8B WOC	1RT/day to WAS (4pm)	2	Low	5	2	0	3:58	4:53(a)
9A Berlin	1RT/day to NYP (4:30pm)	2	Low	4	0	2	4:11(a)	4:38
9B WOC	1RT/day to NYP (4:30pm)	2	Low	5	0	2	4:19(a)	4:46
10A Berlin	1RT/day to NYP (4:30pm) +1RT/day to WAS (11am)	4	Medium	4	2	2	3:50	4:38
10B WOC	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	4	Medium	5	2	2	3:58	4:46

(a) Cross-platform transfer
(SB) Designates southbound as the morning trip direction

Options 1 through 7 consist of northbound trains departing the Delmarva in the morning with return service in the evening. Options 8 and 9 comprise trains leaving New York Penn Station (NYP) or Washington, DC Union Station (WAS) in the morning for Delmarva locations and northbound evening trains. Option 10 is a mix with a morning northbound departure for WAS from the Delmarva and a morning southbound departure from NYP. The reverse occurs in the evening.

Several alternatives involve a cross-platform transfer in Newark. Alternatives that include only a direct train from Delmarva to NYP serve the Washington market by a transfer to a southbound train at Newark. Conversely, alternatives that present direct service to WAS provide a cross-platform transfer at Newark to stations to the north on the NEC.

Ridership and Revenue Projections

Demand and revenue forecasts were developed by Amtrak using its proprietary intercity ridership model. The forecasts are based on population, employment, and demographic changes and trends. The Amtrak intercity model, the standard model used to develop forecasts for all proposed new Amtrak services, does not account for seasonal vacation attractions or seasonal differences in population, thus it does not measure seasonal variations in demand.

Ridership Summary

Based on the above assumptions, travel characteristics such as price, time of train departure, and length of journey, the estimated total travel demand between Delmarva and the markets represented by Northeast Corridor stations was developed. The Amtrak model generated annual ridership and revenue estimates for each of the 21 rail service alternatives described in more detail in Chapter 3.2: two weekend-only service options, one option with a terminus in Berlin and one option with a terminus in West Ocean City; one weekday-only option with a terminus in Lewes; and eighteen weekday-only service options, nine with a terminus in Berlin and nine with a terminus in West Ocean City.

Figure E-5 Service Level Summary

Service Level	Service Description
Weekend	Weekend-only service with one WAS round trip and two NYP round trips
Low	Weekday-only service with one WAS or one NYP round trip
Mid	Weekday-only service with one WAS round trip and one NYP round trip
High	Weekday-only service with one WAS round trip and two NYP round trips

Ridership Estimates

The high fare scenarios each produced ridership estimates within 92 percent of the low fare scenarios suggesting that demand is price-inelastic at this range of fares. The model also produced comparable ridership estimates for the Berlin terminus and West Ocean City terminus options. Ridership estimates for the two options were consistently within a few percentage points of each other across comparable service levels and fare structures indicating some passenger indifference to transferring to a shuttle service. This, however, could be explained by the model's failure to fully consider the convenience of a single-seat ride, or its level of sensitivity to vacation or amenity travel incentives.

Weekend Service Alternatives

The Saturday - Sunday weekend-only options were modeled reflecting direct service to New York City and Washington, D.C. with three inbound trains and three outbound trains: two trains to and from New York and one Washington train in each direction. The weekend-only services offered daily round trip capabilities. For the weekend options, the ridership demand estimates remained relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). The three-day weekend-only service was derived for service with one round trip to WAS and one round trip to NYP.

Low Service Level Alternatives

The low level of weekday-only service options were modeled to reflect a single daily train in each direction between WAS and Delmarva or a single daily train in each direction between NYP and Delmarva. Selected options included the capability to connect easily at Newark with a NEC train to travel

in the opposite direction of Delmarva direct service. A traveler to New York could take the Delmarva Washington train to Newark where a transfer could be made to a northbound NEC train. Options varied by time of day with the service offering the ability to make a round trip connection on Delmarva or, in Washington or New York, directly or through a connection. The ridership estimates remained relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). As would be expected, the low service level, shown in Figure E-6, produces the least ridership. Train load factors, however, are the highest among the service levels.

Figure E-6 Service Level Ridership Projections (2030 Forecast Year)

Service Level	Ridership Estimates	Passengers per Train
Weekend	37,000-50,000*	75-100*
Low	60,000-80,000	115-160
Mid	70,000-90,000	70-90
High	130,000+	85

**Includes the ridership estimates modeled for two-day weekend service and derived for three-day weekend service.*

Source: Amtrak; Parsons Brinckerhoff Calculations

Mid Service Level Alternatives

The mid level of service weekday-only category comprises options that include bi-directional services connecting Delmarva with both WAS and NYP. The range of options varied by time of day and whether the schedule permitted passengers to make a one-day roundtrip to the Delmarva or to Washington and New York. The ridership estimates remained relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). The mid-level category also includes the option with Lewes as a terminus.

As shown in Figure E-6, the mid service level options moderately increased the total ridership. Offering two direct services is more attractive to the market than a service connecting Delmarva to either WAS or NYP, and with a transfer required for travel in the opposite direction on the NEC. The increase in ridership, however, is not sufficient to avoid a decrease in load factors on the trains.

High Service Level Alternatives

The high level of service options were modeled with one round trip to or from WAS and two round trips to or from NYP per day. Options varied by time of day and whether the trains offered the ability to make a round trip connection on the Delmarva or in Washington or New York. The ridership estimates remained relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). The high service level category demonstrated the greatest market capture with train load factors not much less than the mid-service level alternatives.

Revenue

Revenue projections were developed for each of the demand options, and are based on the combination of ridership and fares. The fare structures (high-fare, low-fare) were based on a per-mile ticket price, so overall revenue estimates depended upon the distance between the origin and destination of each trip. The ridership demand estimates remained relatively constant between each fare scenario and within each combination, and revenue remained relatively constant as well. The high-fare scenarios had lower ridership demand estimates, but higher revenue estimates.

Figure E-7 2030 Service Level Revenue Projections

Service Level	Low-Fare Scenario Revenue	High-Fare Scenario Revenue
Weekend	$2.3 million	$2.7 million
Low	$3.1-$4.0 million	$3.7-$4.7 million
Mid	$4.1 million	$4.9 million
High	$6.6 million	$7.7 million

Source: Amtrak

Operations Analysis

Inventory

The railroad line from Davis to the Delmarva consists of three segments:

1. Delmarva Secondary—Davis to Harrington: 56.3 miles

The railroad between Newark (Davis) and Harrington is a single track. Maximum train speed is nominally 60 mph for passenger trains, 40 mph for freight. More than 95 percent of the track is in the FRA Class 3 category or higher. Approximately 34 industries are located on the line, served by eight industrial sidings.

At the present time, the Delmarva Secondary is limited to equipment weighing 273,000 pounds or less. As a point of comparison, the current dual-mode (overhead electric and diesel) New Jersey Transit ALP-45 DP's weigh 284,000 lbs when fully loaded with fuel.

There are 61 public grade crossings on the line, all having warning devices. Approximately 22 of them are protected by gates. The line has 28 private crossings, one with gates.

2. Indian River Running Track/ Secondary Track (Harrington to Frankford)-- 38.8 miles

Similar to the Delmarva Secondary, the line has no signal system. Maximum authorized speed based on FRA track classification is 30 mph for passenger trains, 25 mph for freight. The Indian River Running Track and secondary has authorized weights of 286,000 lbs per car.

3. Snow Hill Line —Frankford to Berlin: 12.4 miles

Operated by the Maryland and Delaware Railroad (MDDE) the railroad between Frankford, Delaware and Berlin, Maryland is a single track. Part of MDDE's Snow Hill Line, four miles of this segment are in Delaware and 8.4 miles in are Maryland. Maximum train speed is nominally 15 mph for passenger trains, 10 mph for freight. The entire track segment is FRA Class 1.

Currently, the Snow Hill Line is limited to equipment weighing 263,000 pounds or less. Of the 22 public grade crossings on the line, approximately 19 have warning devices, but none have gates. The line also has five private crossings, with none protected by gates.

Freight Operation

One or two freight trains transporting a mix of commodities serve the Delmarva each weekday originating at Newark or Wilmington. Trains can begin at either location as two lines enter the Delmarva joining at Porter. Freight traffic is expected to grow on the Delmarva and an increase in trains will introduce a greater potential for operating conflicts between freight and passenger trains. For example, oil is relatively new traffic to the Port of Wilmington. Like coal, it moves via unit trains with all the cars destined for a single consignee.

Passenger Train Equipment

The standard consist for each train set on the Delmarva, which would also have room for passengers traveling only on the NEC, would need to include:

- Dual mode locomotive
- AS-Amfleet I Capstone Coach—70 seats
- AS-Amfleet I Capstone Coach—70 seats
- AS-Amfleet I Capstone Coach—70 seats
- MF-Amfleet I All Table Dinette
- CC Cab Control Car—70 Seats

A locomotive costs $6.5 million and each car costs $4.25 million, with the total cost of each train set estimated at $27.75 million. Each daily round trip is expected to require a train set.

Station Profiles

Structures

The Delmarva intercity passenger service would use the NEC with trains leaving the corridor at Newark to NS' Delmarva Secondary. Plans are currently in place to build the Newark Regional Transportation Center at the existing train station, which would serve the Delmarva passenger trains. Up to five additional new stations would support the service: Middletown, Dover, and Georgetown with terminal stations in either Berlin or West Ocean City, Maryland.

The intermediate stations along the line would be built as "basic stations" consisting of canopied platforms with shelters. The estimated cost of this type of station, including signage, lighting, landscaping and approximately 50 parking spaces is $2.0-$2.5 million per station, considering ADA requirements. A 2000-foot passing siding would be installed at each intermediate station near the platform.

Middletown Station

The proposed location of the Middletown station was identified in the Downstate Commuter Rail Alternatives Analysis study from 2005. The station would be located off SR 71 along the rail in the Northern portion of Middletown, not far for the former Middletown Train Station.[6]

Dover Station

The proposed Dover station would be located along the rail line between Division Street and Lookerman Street/Forest Ave. The location is approximately one mile from the Delaware State Capital building and many other State Agency buildings. It is near the old PRR station just south of Lookerman Street. The former station was renamed the George V. Massey Station in 2000 and is now used for public business including education-related state agencies. An alternative site would be in proximity to the Dover Transit Center on Water Street between Queen and West streets.

Georgetown Station

The proposed Georgetown Station would be located off Deposit Street near the current Georgetown Transit Hub and Park and Ride. This location is less than a half of mile from the Town Hall and Georgetown Circle. A new bus stop location as well as additional parking has been proposed near the station.

Terminus Station - Berlin/West Ocean City

The proposed Berlin station is located along the rail line between Harrison Avenue and Main Street in Berlin. Two new parking locations and a new bus stop are proposed near the station.

Two possible locations are under consideration for the West Ocean City Station location with the eventual location dependent on the alignment that is chosen. One location is at the intersection of

[6] DMJM Harris/AECOM, Downstate Commuter Rail Alternatives Analysis, Volume II – Alternatives Analysis Report

Stephen Decatur Highway and Sunset Avenue. The alternative is located off Route 50 not far from the bridge crossing the inlet into Ocean City.

The terminal station at either Berlin or West Ocean City would have an enclosed waiting room with ticketing capability. The grounds would have at least 50 parking spaces. This station estimate would be slightly higher at $5 million. If the terminus were West Ocean City, Berlin would have a basic station similar to others on the route.

Infrastructure Requirements

Infrastructure improvements will principally be made on the Delmarva lines. The single improvement required on the NEC is the construction of a direct connection between the Delmarva and the NS freight yard in Newark. This connection is already planned as part of Newark Regional Transportation Center station improvement project. Thus, its cost is not included in the capital program for the Delmarva passenger service. No other new infrastructure or modifications to operations on the NEC are anticipated, as the proposed service will have a minimal impact on the NEC's operating capacity.

To provide a safe operation of the proposed service and not to interfere with existing or future freight service on the line, NS requires several infrastructure improvements on its segment of the route between Newark and Frankford, which are described below.

Stations

Two types of stations would be constructed. The terminal station (Berlin or West Ocean City) would feature an enclosed waiting room with ticketing capability and at least 50 parking spaces. The second type of station will serve the intermediate stops. These stations will be on high-level platforms with canopies and a basic shelter. Each would also have parking capacity of 50 vehicles. The terminal station is estimated to cost $5 million, while the intermediate stations are estimated to cost $2.5 million each. Thus, the total cost of stations would be $12.5 million to $15 million depending on whether the terminal station is Berlin or West Ocean City.

Typical intermediate station example: AMTRAK's New Buffalo, MI Station

Station Tracks

ADA compliant high-level passenger station platforms along the line will need sufficient clearance so as not to hinder freight operations. In addition, the Delmarva Secondary and the Indian River Secondary do not have any passing tracks that permit two trains to meet or overtake one another. A modified track configuration at each station would both enable ADA-compliant high-level platforms on the sidings and preserve the integrity of the freight service. Four passing tracks would need to be constructed at $5 million for a total cost of $20 million.

Train Control-Signal System

FRA has issued proposed regulations in response to the US Rail Safety Improvement Act of 2008 that require Positive Train Control (PTC) by 2015 on virtually all rail lines over which scheduled passenger trains operate. [7] Norfolk Southern does not operate regularly scheduled passenger trains over non-signaled lines, consequently the railroad has no plans to install PTC on this line. The cost of any PTC installation required for passenger operations would need to be borne by the sponsor of the passenger operation. Because the Delmarva lines are to be used for regularly scheduled passenger trains, the implementation of PTC is mandated.

Currently, the route has no signal system. This limits train speed and adversely affects safety. In NS' view, signaling is not necessary for freight operations on this line, but a signal system is important to ensure the integrity of the track structure and a safe operation overall for passenger operations. Train control would need to be provided by an Automatic Block System (ABS) energized by track voltage that can thus detect broken rails and similar aberrations.[8] NS policy generally calls for at least an ABS system for territory with regularly scheduled passenger trains.

The investment in combined PTC and ABS is $550,000 per mile. The total cost of the train control system would be $65.1 million with Berlin as the Delmarva terminus and $67.9 million with service to West Ocean City.

Road Crossings

Currently 171 public and private road crossings are not protected by gates, which would be required for the passenger operation. Timing circuits on signalized road crossings would also need to be upgraded

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[7] Positive Train Control (PTC) is a collision-avoidance system for monitoring and controlling train movements. In addition to train separation, a PTC system is capable of enforcing line speed, temporary speed restrictions, and wayside worker safety. Essentially, the system works through the Nationwide Differential Global Positioning System (NDGPS). The train receives information about its own location and where and how fast it may safely travel (movement authorities).

[8] Automatic Block Signaling (ABS) describes a fixed signaling system where the railroad line is divided into "blocks." (A block is the distance between two signals.) The automatic operation results from the system's ability to detect an occupancy or obstruction in the blocks ahead of the train by passing a low voltage current through the track between signals and conveying that information to trains through fixed signal indications.

and retimed for passenger train operation. The crossings would be outfitted with constant warning time technology. The 124 public roads would be equipped with four quadrant gates at a cost of $37.2 million and dual gates with flashing signals would be installed at the 47 private crossings at a cost of $8.7 million.

Rail, Ties, and Ballast

Rail, tie, and ballast condition on both the Delmarva Secondary and Indian River Secondary would need to be improved to accommodate passenger trains operating at higher speeds. While the rail on the entire route is welded, some has been in its current location for almost 30 years, and all rail was re-laid from other, higher-tonnage locations. Norfolk Southern maintains the line to current traffic levels, and often timetable speeds are not reflective of current conditions with trains operating well below the posted speed limit. Currently, nine specific slow orders are in place on the Delmarva Secondary north of Harrington, affecting approximately 15 miles of track. Included in that total are 12 miles of 25 MPH restriction and one mile of 10 MPH restriction. On the Indian River Secondary, there are three 10 MPH restrictions. The line between Frankford and Berlin operated by the MDDE will also require upgrading to accommodate passenger trains. Additional maintenance or capital costs to upgrade or maintain track conditions beyond that required to operate freight trains would be the obligation of the passenger train's sponsor.

Improvements on the 100-mile Norfolk Southern segment between Newark and Frankford are estimated to cost $851,000 per mile, for a total of $90.2 million. Improvements to the MDDE are estimated to cost $1.2 million per track mile over the 12.4 miles with a total cost of $14.9 million.

West Ocean City Extension

Although the favorable route alignment to West Ocean City includes an existing right of way, constructing the line is still a significant endeavor. Figure E-8 summarizes the infrastructure upgrades and cost.

The capital investment to begin service, however, is significant. As shown in Figure E-8, infrastructure costs would range from $360 million with a terminus at Berlin to $700 million with a terminus at West Ocean City. Purchasing of equipment would add another $27.8 million per trainset, or a $1.2 million per year increase in operating costs if the purchase price is amortized over the life of the equipment.

Figure E-8 Estimated Infrastructure Costs ($Millions)

	Berlin Terminus	West Ocean City Terminus
Stations, Platforms and Parking	$13	$16
Passing Sidings and Track Improvements	$125	$125
Train Control and Signals	$65	$68
Grade Crossing Protection	$46	$46
Construction Berlin - WOC		$200
Maintenance Facility	$16	$16
Design/Contract Management	$38	$92
Other/Contingency	$57	$138
Initial Capital Investment	$360	$700

Operating Economics

Annual operating costs for the 22 options ranged from $2.9M for Option Weekend 1c, which provides one train in each direction between New York Penn Station and Berlin three days per week (Friday-Sunday), to $11.2M for Option 1B, which provides two trains in each direction between New York Penn Station and West Ocean City and one train in each direction between Washington Union Station and West Ocean City five days per week (Monday-Friday). These two options also represent the lowest and highest revenue of the 22 options with $1.9M and $6.0M respectively. These costs and revenue projections result in an operating loss of $1.0M for Option Weekend 1c and $5.2M for Option 1B.

Option 7A, which provides weekday service with one train in each direction between New York Penn Station and Berlin, requires the lowest operating subsidy with an operating loss of $0.7M.

Figure E-9 Annual Operating Subsidy - Lowest and Highest Delmarva Rail Options (2030)

Option	Description	O&M Costs	Revenue	Annual Subsidy
	Lowest			
Option7A	1x/day to NYP (9:30am)	$4,339,330	$3,675,000	$664,330
Option9A	1x/day to NYP (4:30pm)	$4,267,934	$3,450,000	$817,934
Option7B	1x/day to NYP (9:30am)	$4,622,802	$3,744,000	$878,802
Weekend1c (Fri-Sun only)	1x/day to NYP (4:30pm)	$2,864,809	$1,858,000	$1,006,809
Option9B	1x/day to NYP (4:30pm)	$4,551,475	$3,522,000	$1,029,475
Option6A	1RT/day to WAS (10:00am)	$4,218,979	$3,186,870	$1,032,109
	Highest			
Option10A	1x/day to NYP (7pm) + 1x/day to WAS (11am)	$7,068,293	$3,307,000	$3,761,293
Option4B	1x/day to NYP (5:30am) + 1x/day to WAS (9:30am)	$7,699,087	$3,901,000	$3,798,087
Option10B	1x/day to NYP (7pm) + 1x/day to WAS (11am)	$7,552,979	$3,429,000	$4,123,979
Option1A	2x/day to NYP (5:30am+3pm)+ 1x/day to WAS (6:30am)	$10,640,045	$5,910,000	$4,730,045
Option1B	2x/day to NYP (5:30am+3pm)+ 1x/day to WAS (6:30am)	$11,211,145	$6,011,000	$5,200,145

Normalizing the subsidy on a rider basis still favors the New York services, however, the option of a single train to Washington is one of the highest ranked alternatives as shown in Figure E-10. The highest subsidies per passenger are required by the options with multiple trains indicating that the introduction of additional trains does not significantly expand ridership.

Figure E-10 Subsidy per Rider- Lowest and Highest Options (2030)

Option		O&M Costs	Revenue	Annual Subsidy	Subsidy Per Rider
		Lowest			
Option7A	1RT/day to NYP (9:30am)	$4,339,330	$3,675,000	$664,330	$8.79
Option7B	1RT/day to NYP (9:30am)	$4,622,802	$3,744,000	$878,802	$11.47
Option9A	1RT/day to NYP (4:30pm)	$4,267,934	$3,450,000	$817,934	$11.55
Option9B	1RT/day to NYP (4:30pm)	$4,551,475	$3,522,000	$1,029,475	$14.34
Option6A	1RT/day to WAS (10am)	$4,218,979	$3,187,000	$1,031,979	$15.24
		Highest			
Option5	1RT/day to LEWES TO NYP/WAS (6am; 7am)	$5,600,455	$2,611,000	$2,989,455	$48.29
Weekend1A	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,440,808	$2,152,000	$2,288,808	$50.30
Option10A	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,068,293	$3,307,000	$3,761,293	$50.83
Weekend1B	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,656,670	$2,166,000	$2,490,670	$54.38
Option10B	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,552,979	$3,429,000	$4,123,979	$54.48

Although weekend and weekday services were examined separately, actual operations would likely be daily to leverage investment in infrastructure and equipment. Figure E-11 provides an example of the financial performance of a daily service.

Daily Service

With the infrastructure improvement costs as well as equipment costs fixed, the introduction of daily service will only increase the total operating costs offset by increased revenues. Figure 8-8 shows the operating expense, revenue, and operating subsidy required by a seven day a week service.

Figure E-11 Daily Service Financial Parameters (2030)

	Daily Trains	NEC Market	Riders	O&M Costs	Revenue	Annual Subsidy	Subsidy Per Rider
Option1A	6	NYP/WAS	174,005	$15,080,853	$8,062,439	$7,018,414	$40.33
Option1B	6	NYP/WAS	185,705	$15,867,815	$8,176,756	$7,691,059	$41.42
Option2A	2	WAS	85,310	$5,875,634	$3,842,013	$2,033,621	$23.84
Option2B	2	WAS	84,291	$6,258,209	$3,901,764	$2,356,446	$27.96
Option3A	2	NYP	80,706	$5,807,047	$3,749,160	$2,057,887	$25.50
Option3B	2	NYP	79,512	$6,184,977	$3,775,157	$2,409,821	$30.31
Option4A	4	NYP/WAS	115,040	$11,103,577	$5,247,555	$5,856,022	$50.90
Option4B	4	NYP/WAS	117,236	$11,777,116	$5,398,207	$6,378,909	$54.41
Option6A	2	WAS	91,674	$5,979,843	$4,347,228	$1,632,614	$17.81
Option6B	2	WAS	91,459	$6,377,431	$4,467,087	$1,910,344	$20.89
Option7A	2	NYP	102,371	$6,150,425	$5,012,882	$1,137,543	$11.11
Option7B	2	NYP	101,680	$6,542,933	$5,092,984	$1,449,949	$14.26
Option8A	2	WAS	91,299	$6,098,738	$4,321,187	$1,777,552	$19.47
Option8B	2	WAS	90,765	$6,499,914	$4,415,272	$2,084,642	$22.97
Option9A	2	NYP	96,047	$6,177,807	$4,688,809	$1,488,998	$15.50

Fifteen daily service options were developed based on the various weekend and weekday options described earlier. Option 7, with a daily train in each direction between the Delmarva and NYP would require the least subsidy with $1.1 million for Berlin service and $1.5 million for WOC service in 2030. As more trains are operated, the subsidy would exceed $7 million (Option 1). This represents approximately a $500,000 increase over the weekday service. Option 7 also would represent the lowest subsidy per rider at $11.11 (Berlin) and $14.26 (WOC).

Project Feasibility

Several options demonstrate acceptable operating cost recovery ratios and acceptable subsidy levels. Weekday only Option 6, Option 7, and Option , have cost recovery ratios between 75 percent and 85 percent. Annual subsidies are $1 million or less depending on the option, translating to between $8.50 and $15.50 per rider. The corresponding seven day per week services have lower cost recovery ratios, however, they still range between 70 percent and 80 percent.

Figure E-12 Top Ranking Services (2030)

Option	O&M Costs	Revenue	Annual Subsidy	Subsidy Per Rider	Farebox Coverage
Weekday Only					
Option 6A Berlin	$4,218,979	$3,187,000	$1,032,109	$15.24	74%
Option 6B WOC	$4,505,869	$3,284,000	$1,222,029	$17.74	72%
Option 7A Berlin	$4,339,330	$3,675,000	$664,482	$8.79	83%
Option 7B WOC	$4,622,802	$3,744,000	$878,853	$11.47	80%
Option 9A Berlin	$4,267,934	$3,450,000	$817,535	$11.55	80%
Option 9B WOC	$4,551,475	$3,522,000	$1,029,107	$14.33	76%
Daily Service					
Option 6A Berlin	$5,979,843	$4,347,228	$1,632,614	$17.81	73%
Option 6B WOC	$6,377,431	$4,467,087	$1,910,344	$20.89	70%
Option 7A Berlin	$6,150,425	$5,012,882	$1,137,543	$11.11	81%
Option 7B WOC	$6,542,933	$5,092,984	$1,449,949	$14.26	78%
Option 9A Berlin	$6,177,807	$4,688,809	$1,488,998	$15.50	76%

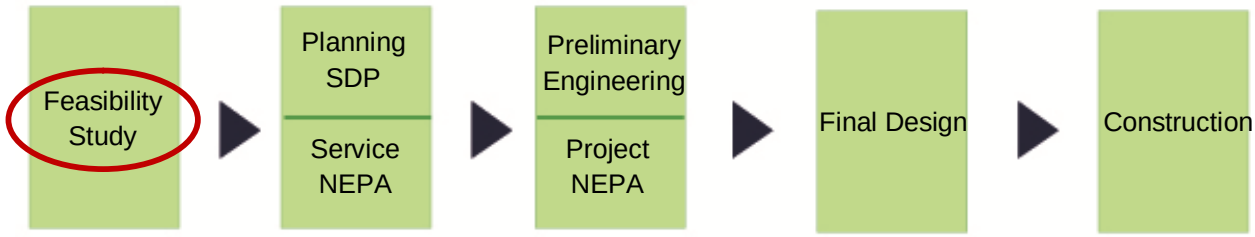
The capital investment, however, is significant. Infrastructure costs would range from $360 million with a terminus at Berlin to $700 million with a terminus at West Ocean City. Purchasing of equipment would add another $27.8 million per trainset, or a $1.2 million per year increase in operating costs if the purchase price is amortized over the life of the equipment.

Several service options demonstrate acceptable ridership, farebox recovery ratios, and subsidy levels. Investment costs of $360 million and $700 million to upgrade the line, however, pose a hurdle to implementation. Should funding become available for the service, the next steps are to expand this feasibility assessment by more precisely determining the required investment through operations simulation modeling and conducting an analysis of the benefits and economic impacts to measure against the investment costs.

1 Introduction

The States of Delaware and Maryland are interested in investigating the potential for restoring passenger rail service on the Delmarva Peninsula. The proposed passenger rail service under consideration would operate along existing freight lines owned by Norfolk Southern Corporation (NS) and the Maryland and Delaware Railroad (MDDE). To be eligible for federal funding for the proposed service, the Delaware Department of Transportation (DelDOT) and Maryland Department of Transportation (MDOT) are required by the Federal Railroad Administration (FRA) to develop a Passenger Rail Corridor Investment Program, illustrated in Figure 1-1. Typically, the first of several steps is the preparation of Service Development Plan (SDP). The SDP can be developed in parallel with a corridor-level environmental analysis (Service NEPA) or sequentially, with funding considerations typically the deciding factor.

Figure 1-1 FRA Passenger Rail Corridor Investment Program Steps



In some instances, states have elected to prepare feasibility analyses prior to the development of the SDP. By conducting an initial feasibility analysis, a state can determine whether a proposed service is viable prior to the state investing in the preparation of the more expansive SDP.

The States of Delaware and Maryland decided to do the latter by preparing a feasibility assessment that can readily be expanded into a SDP. The feasibility assessment includes sections required in an SDP as stipulated by the FRA:

- Purpose and Need
- Rationale
- Identification of Alternatives
- Demand and Revenue Forecast
- Operations Modeling
- Station and Access Analysis
- Conceptual Engineering and Capital Programming
- Operating and Maintenance Cost
- Profit and Loss Statement

This feasibility assessment provides stakeholders with a description of the purpose and need for the service and the configuration of the service, along with necessary information to evaluate the expected financial performance of the operation.

The passenger rail service that is the subject of this feasibility assessment is intercity. Schedules have been developed that the intercity market would find attractive. Commuter service would require more frequent service, additional stations, and different passenger equipment. Commuter rail alternatives on the Delmarva have been evaluated in the 2005 study, the Downstate Commuter Rail Alternatives Analysis.

1.1 History of Passenger Rail Service in Delmarva

Passenger rail service on the Delmarva Peninsula is not a new idea. The New Castle and Frenchtown Turnpike and Railroad Company converted their turnpike into a railroad as early as 1831, moving goods and people from northern Delaware to the junction of the Susquehanna River and the Chesapeake Bay. This was the first railroad in Delaware. The Philadelphia, Wilmington, and Baltimore Railroad (PW&B) connected Wilmington to Baltimore and Philadelphia. The Delaware Railroad, chartered in 1836, built a connection from near New Castle to Seaford, DE in 1856, extended to the Maryland State line in 1859,[9] and reached Cape Charles, Virginia, near the southern end of the Delmarva Peninsula, by 1884.[10] Barges and ferries transported freight and passengers to Norfolk, VA.[11] The PW&B became part of the Pennsylvania Railroad (PRR) system in the 1880s, forcing the Baltimore & Ohio Railroad to build its own line from Baltimore to Philadelphia via Wilmington. By 1899, the PRR also operated many branch lines in Delmarva including:

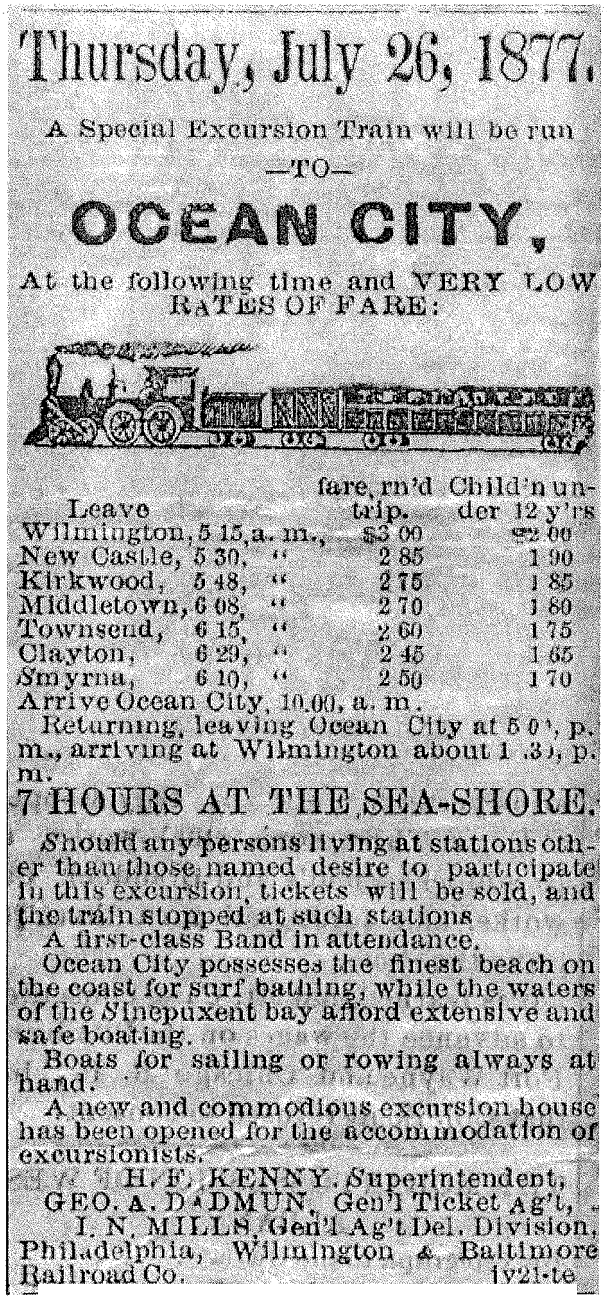
- Townsend, DE to Massey, MD, with branches from Massey to Chestertown and Centreville, MD
- Smyrna, DE to Easton and Oxford, MD
- Harrington, Milford, and Georgetown, DE to Snow Hill, MD
- Georgetown to Lewes and Rehoboth Beach, DE
- Seaford, DE to Federalsburg and Cambridge, MD

Smaller railroads operated services from Queenstown, MD and later Love Point, MD, to Lewes, DE (Queen Anne's RR), from Tolchester, MD, past Smyrna, DE (Baltimore & Delaware Bay Railroad) and McDaniel to Ocean City, MD (Baltimore, Chesapeake & Atlantic Railroad, formerly of the Baltimore and Eastern Shore Railroad). The Queen Anne's Railroad offered connections to Baltimore via ferry at Love Point and to Cape May, NJ, from Lewes.[12] The Cape May, NJ Ferry still operates across the Delaware Bay. All three of these rail lines became the property of the PRR and/or its subsidiaries.[13,14] Other branches were also built and abandoned in various places across the Peninsula during the late 1800s.

[9] http://www.seafordhistoricalsociety.com/school_contest/coming_rr.html
[10] http://www.capecharles.org/history.htm
[11] http://www.capecharles.org/history.htm
[12] http://archives.delaware.gov/markers/sc/QUEEN%20ANNES%20RAILROAD%20SC%20116.shtml
[13] http://archives.delaware.gov/markers/sc/QUEEN%20ANNES%20RAILROAD%20SC%20116.shtml
[14] http://www.abandonedrails.com/McDaniel_to_Ocean_City

Both freight and passenger rail service stimulated prosperity in the Delmarva region. The rail connection in 1856 made Seaford a prosperous town, providing easy connections to the northeastern United States and to the Chesapeake Bay. By 1868, the rails had reached Georgetown. With the extension of the railway to Lewes the following year, and the addition of connections to the Rehoboth resort and the lower Eastern Shore in the 1870s, the Delmarva Peninsula experienced a period of unprecedented growth. Located at the hub of this network, Georgetown was transformed by a growing population and booming economy. The town's first passenger station was built in the 1860s.[15] By the 1880s, a steady increase in the number of travelers resulted in the need for a newer and larger facility.

[15] http://www.georgetowntrainstation.org/TrainStationHIstory.htm



Thursday, July 26, 1877.

A Special Excursion Train will be run

—TO—

OCEAN CITY,

At the following time and VERY LOW RATES OF FARE:

Leave		fare, rn'd trip.	Child'n under 12 y'rs
Wilmington,	5 15, a. m.,	$3 00	$2 00
New Castle,	5 30, "	2 85	1 90
Kirkwood,	5 48, "	2 75	1 85
Middletown,	6 08, "	2 70	1 80
Townsend,	6 15, "	2 60	1 75
Clayton,	6 29, "	2 45	1 65
Smyrna,	6 10, "	2 50	1 70

Arrive Ocean City, 10.00, a. m.

Returning, leaving Ocean City at 5 0', p. m., arriving at Wilmington about 1 .3', p. m.

7 HOURS AT THE SEA-SHORE.

Should any persons living at stations other than those named desire to participate in this excursion, tickets will be sold, and the train stopped at such stations.

A first-class Band in attendance.

Ocean City possesses the finest beach on the coast for surf bathing, while the waters of the Sinepuxent bay afford extensive and safe boating.

Boats for sailing or rowing always at hand.

A new and commodious excursion house has been opened for the accommodation of excursionists.

H. F. KENNY, Superintendent,
GEO. A. ADMUN, Gen'l Ticket Ag't,
I. N. MILLS, Gen'l Ag't Del. Division,
Philadelphia, Wilmington & Baltimore Railroad Co. jy21-te

Newspaper article advertising passenger service to Ocean City, MD.

By the mid 20th century, roadway improvements and the growing use of automobiles and trucks led to a declining market for railroad services. Though the shipment of freight by rail would continue, passenger service to Georgetown terminated in the spring of 1949. Between the 1920s and the 1980s the Queen Anne's[16] and the Baltimore, Chesapeake & Atlantic Railroads[17] were abandoned, along with the Tolchester-Chestertown portion of the Baltimore and Delaware Bay Railroad. Traces of the lines can still

[16] http://archives.delaware.gov/markers/sc/QUEEN%20ANNES%20RAILROAD%20SC%20116.shtml
[17] http://www.abandonedrails.com/McDaniel_to_Ocean_City

be seen on satellite imagery. In Queen Anne County, some of this track has been converted into a rails-to-trails project.[18]

By the mid-20th century, the PRR became the dominant railroad on the Delmarva by acquiring many of the smaller lines. The PRR operated two named trains serving the peninsula: the Del-Mar-Va Express (Philadelphia-Cape Charles-Norfolk) was the day train, and the Cavalier was the overnight train, with sleepers, on the route. The Cavalier was discontinued in 1956. The Del-Mar-Va Express lost its stature as a named train and was finally discontinued in 1965. A trial train, known as the Blue Diamond, was operated for six months from July to December 1965. After it stopped operating, all passenger service on the Delmarva was discontinued.

Freight service continues on the Delmarva today. The Delmarva rail lines, along with others of the PRR, became part of the merged Penn Central (PC) Transportation Company in 1968. Penn Central declared bankruptcy two years later in 1970, but continued to operate in receivership until April 1, 1976 when it was consolidated with the other bankrupt Northeast railroads into a new enterprise, the Consolidated Rail Corporation (Conrail). The newly created Conrail included the lines from Newark, DE, to Cape Charles, VA, and from Harrington to Frankford, DE. The remaining branch lines were not in Conrail's Final System Plan and so they were transferred to a new shortline: the Maryland and Delaware Railroad Company (MDDE).[19] The Smyrna – Oxford branch was then abandoned. In 1999, Conrail was dissolved and its assets sold to CSX and Norfolk Southern (NS) or became part of the Conrail Shared Assets Operations. Both freight main lines, the Delmarva Secondary and the Indian River Secondary in Delmarva, now belong to NS and are being considered for the proposed service.

Through the Rail Passenger Service Act of 1970, Congress created The National Railroad Passenger Corp (NRPC or Amtrak) to assume responsibility for the intercity rail passenger services turned over to Amtrak by the railroads. Amtrak was a response to the freight railroads' contention that they could operate profitably if they could free themselves of the money-losing passenger services. This included the Northeast Corridor connecting Wilmington with Boston and Washington.

The historic importance of the railroads to the Delmarva Peninsula is not without recognition. Portions of the original Delaware Railroad lines are listed on the National Register of Historic Places and various locations are marked with state historic monument markers.[20] The Georgetown station served as an office for various railway functions until it was sold in 1972. The building was vacant when it was purchased by the Historic Georgetown Association in 1996.[21] An extensive project to restore the exterior of the building to its original appearance was completed in 2003, but the building was destroyed by a fire in May 2011.[22]

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[18] http://www.dnr.state.md.us/greenways/counties/queenannes.html
[19] http://www.mdde.com/history.html
[20] http://www.nationalregisterofhistoricplaces.com/de/kent/districts.html
[21] http://www.georgetowntrainstation.org/TrainStationHIstory.htm
[22] http://www.georgetowntrainstation.org/

Delaware's 2004 Rail to the Fair excursion vicinity of Wyoming, Delaware. Photo by Tim O'Brien, DelDOT.

Several prior studies have examined the possibility of using the Delmarva line for passenger service. Completed in 2005, the Downstate Commuter Rail Alternatives Analysis examined reinstating passenger service between Newark, Middletown, and Dover with other stations along the way. Four Build Alternatives were evaluated based on financial, social, environmental and transportation factors to determine the feasibility of instating each service:

- Build Alternative 1: Wilmington to Middletown R2 Service – New Commuter Rail Service between Newark and Middletown (Requires Transfer from SEPTA Wilmington/Newark Line at Newark) and rail extension bus service between Middletown and Dover

- Build Alternative 2: Wilmington to Middletown Direct- New Commuter Rail Service between Newark and Middletown (Direct from Wilmington to Middletown) and rail extension bus service between Middletown and Dover

- Build Alternative 3: Wilmington to Dover R2 Service – New Commuter Rail Service between Newark and Dover (Requires a transfer from SEPTA Wilmington/Newark Line at Newark

- Build Alternative 4: Wilmington to Dover Direct - New Commuter Rail Service between Wilmington and Dover

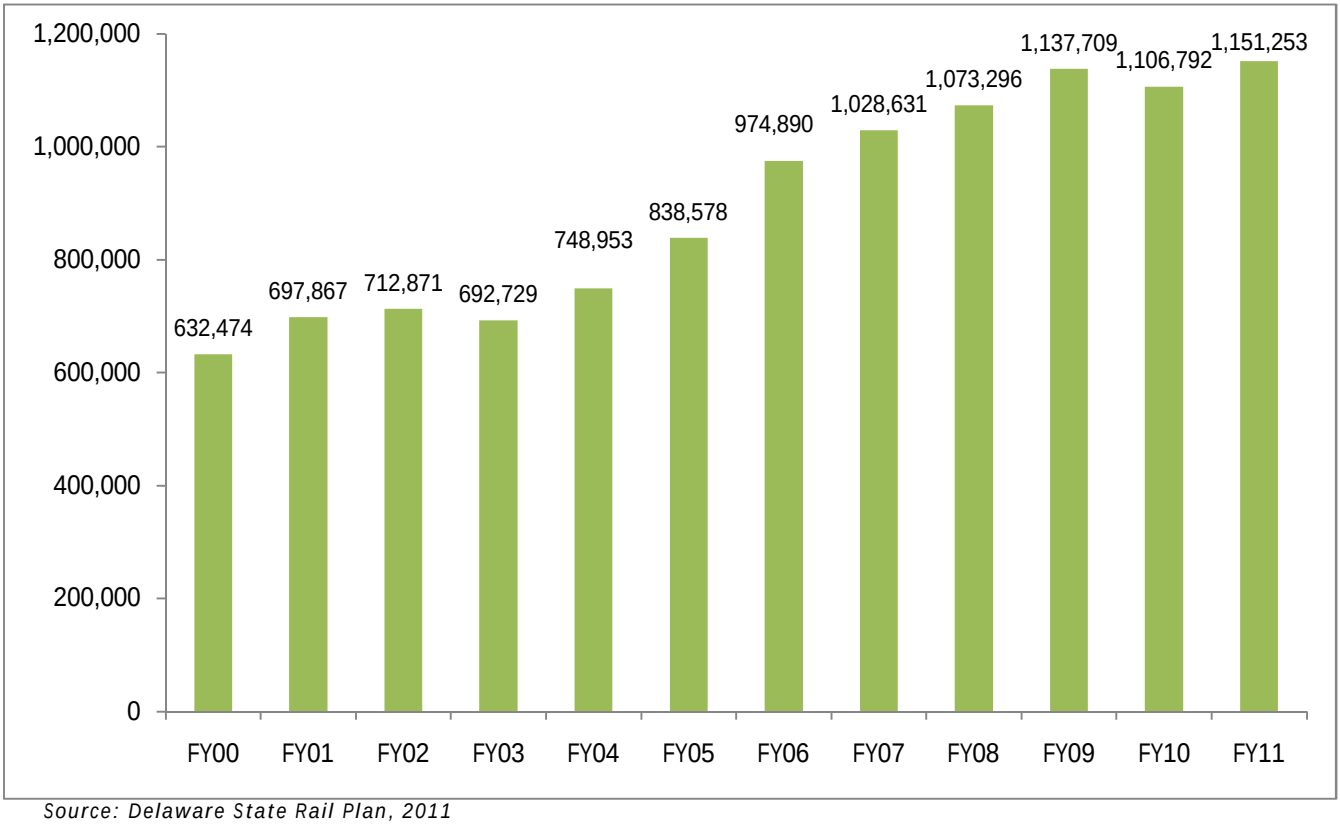
The analysis found that Alternative 2, with direct service to Wilmington from Middletown was the most attractive service based on financial and transportation criteria. However, the study concluded there would not be sufficient ridership to support the service nor would it be cost effective to operate the service at that time.[23]

[23] DMJM Harris, AECOM, BMI SG, State of Delaware Downstate Commuter Rail Alternatives Analysis, Volume II, September 2005.

2 Purpose and Need

As with many areas across the country, Delaware has experienced a renewed interest in passenger rail travel. The combined Amtrak ridership for Newark and Wilmington in FY 2012 was 752,528.[24] There was a 240 percent increase in Newark, with one to two trains a day in each direction, and 4.2 percent in Wilmington, with close to 40 trains in each direction, since FY 2003. Commuter rail ridership on SEPTA's Wilmington/Newark line has also increased over the last decade with four stations now located in Delaware as illustrated in Figure 2-1. Since FY 2000, ridership on SEPTA's Wilmington/Newark line has nearly doubled.

Figure 2-1 SEPTA Wilmington/Newark Line – Delaware Ridership

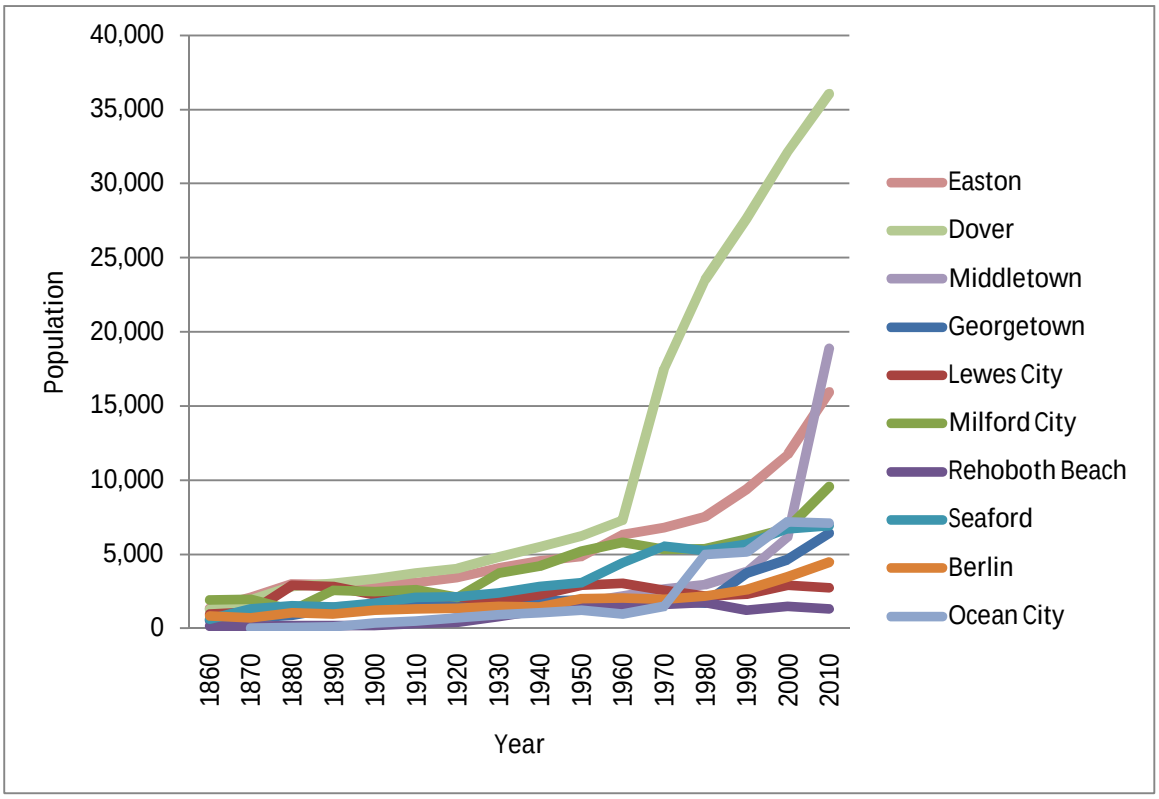


Source: Delaware State Rail Plan, 2011

Population growth in the region has accelerated in recent decades, especially in Dover, Milford, Middletown, Ocean City, Berlin, and Easton, as illustrated in Figure 2-2 below. Rising population in suburban developments, such as those on the Delmarva, will continue to increase traffic and congestion on local roads. The continued development of resort communities along the coast also adds to the burden of local roads; although the beach towns support a few thousand residents year round they can host tens of thousands of visitors during the peak season.

[24] Amtrak Fact Sheet 2012 <http://www.amtrak.com/pdf/factsheets/DELAWARE12.pdf>

Figure 2-2 Historic Population Growth in Delmarva



Source: US Census 2010

The number of year round residents is expected to continue to grow rapidly. Since 2000, the population of Sussex County has increased by over 25 percent and is predicted to be nearly double the 2000 population by 2040. Figure 2-3 shows the Sussex County population growth trend developed by the Delaware Population Consortium. With many people retiring to the resort areas in Sussex County, approximately 32 percent of the 2040 population in Sussex County is predicted to be 65 or older. Providing opportunities for alternative travel modes for an aging population is important for the anticipated growth in the region.

Figure 2-3 Sussex County, Delaware Populations and Projections[25]

2000	2005	2010	2015	2020	2025	2030	2035	2040
157,317	177,219	197,870	216,940	235,574	253,832	271,018	288,393	306,276

Source: Delaware Population Consortium, Annual Population Projections, October 27, 2011 Version 2011.1 Revised March 8 2012.

As shown in figure 2-4, the population of the Eastern Shore of Maryland, comprising Dorchester, Somerset, Wicomico, and Worcester Counties, is also growing. Berlin and Ocean City, potential termini

[25] Delaware Population Consortium, *Annual Population Projections*, October 27, 2011 Version 2011.1 Revised March 8 2012.

of the proposed rail service, are both located in Worcester County. The Eastern Shore is projected to grow nearly 50 percent from its 2000 population of 186,608 to 256,100 by 2040. Worcester County itself is projected to grow 38 percent by 2040.

Figure 2-4 Lower Eastern Shore Region, Maryland Populations and Projections[26]

Counties	2000	2005	2010	2015	2020	2025	2030	2035	2040
Dorchester County	30,674	31,050	32,250	34,050	35,700	37,050	38,250	39,300	40,200
Somerset County	24,747	25,550	26,200	27,050	27,800	28,450	28,850	29,200	29,500
Wicomico County	84,644	90,050	95,300	100,800	106,450	111,650	116,450	120,900	124,900
Worcester County	46,543	48,850	49,800	52,650	55,300	57,350	58,950	60,350	61,500
Eastern Shore Total	186,608	195,500	203,550	214,550	225,250	234,500	242,500	249,750	256,100

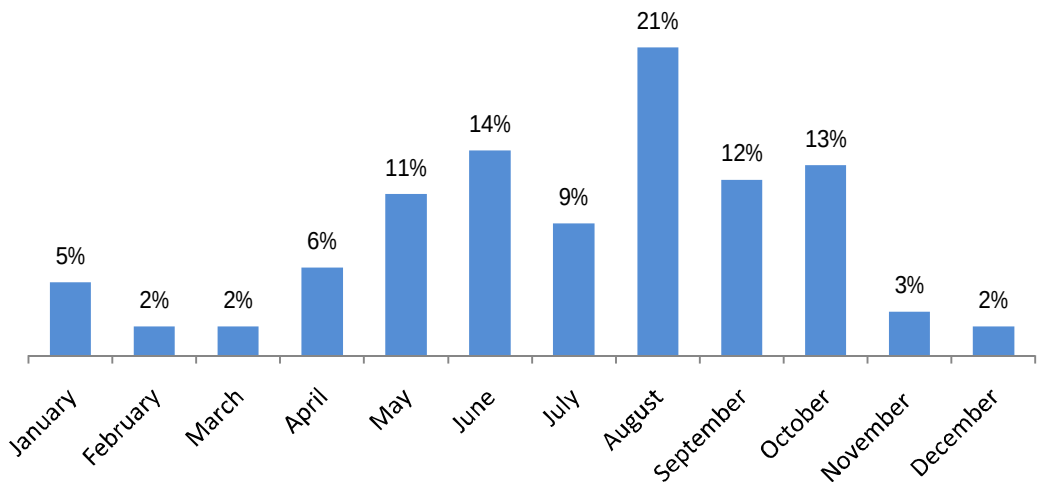
Source: Maryland Department of Planning, Historical and Projected Total Population for Maryland's Jurisdictions November 2010

Research conducted by BEACON (Business Economic and Community Outreach), an outreach entity of Salisbury University's Franklin P. Perdue School of Business, found the Delmarva region to have a rapidly growing elderly population as there is a continued trend of out-migration of youth and in-migration of retirees. To ensure that region is equipped to provide for the aging population, GrayShore, a network of over 300 private, public and not-profit sector organizations was founded. It works to educate regional service providers and decision makers about the impact the changing demographics will have on regional services, the economy, and workforce. The need to provide services that reflect this trend is important for the region. This includes having transportation options available as driving may become more difficult for an aging population.[27]

Adding to the mobility needs of a growing population is the visitor-generated demand for transportation; an estimated six million visitors travel to coastal Delaware[28] each year and an estimated eight million travel to Ocean City Maryland.[29] The visitors generate a significant amount of intercity traffic, especially in the summer months. Figure 2-5 illustrates responses to surveys about the month of visits to Coastal Delaware.

[26] Maryland Department of Planning, Historical and Projected Total Population for Maryland's Jurisdictions November 2010.
[27] Diriker, Dr. Memo, Beacon Brings Multifaceted Research and Consulting to Delmarva, 2012.
[28] http://www.dnrec.state.de.us/dnrec2000/Beaches.htm
[29] Ocean City Convention and Tourism <http://ococean.com/media>

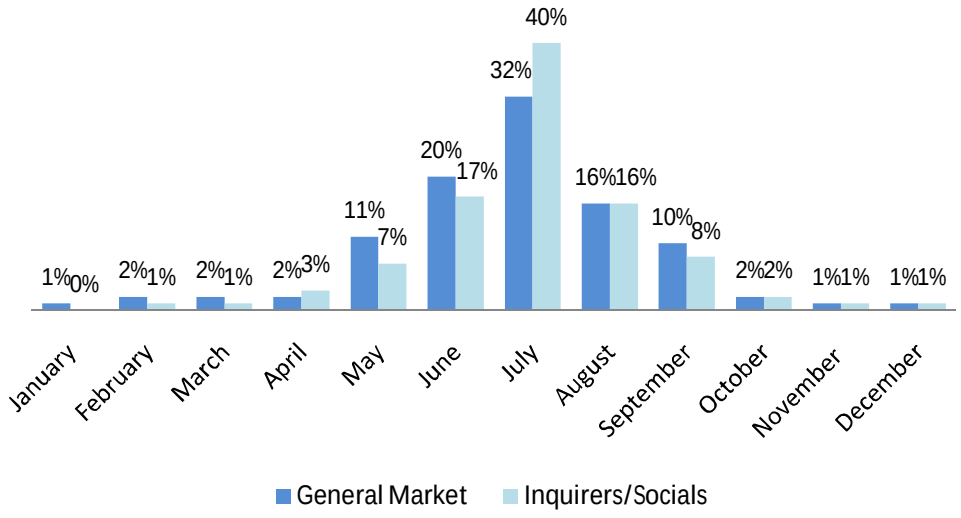
Figure 2-5 Visitors Traveling to Coastal Delaware - Month of Travel



Source: Global Insight, Southern Delaware 2010 Visitor Survey Report

Figure 2-6 below illustrates the survey results conducted by Equation Research for Ocean City, MD comparing travel of two populations: (1) the general market which was defined as residents of the following areas: Baltimore, Harrisburg-Lancaster-Lebanon-York, New York, Philadelphia or Washington D.C. and (2) Inquirers/Socials which were defined as people that inquired through the ococean.com website or follow Ocean City through Facebook or Twitter.[30]

Figure 2-6 Visitors Traveling to Ocean City, MD - Month of Travel

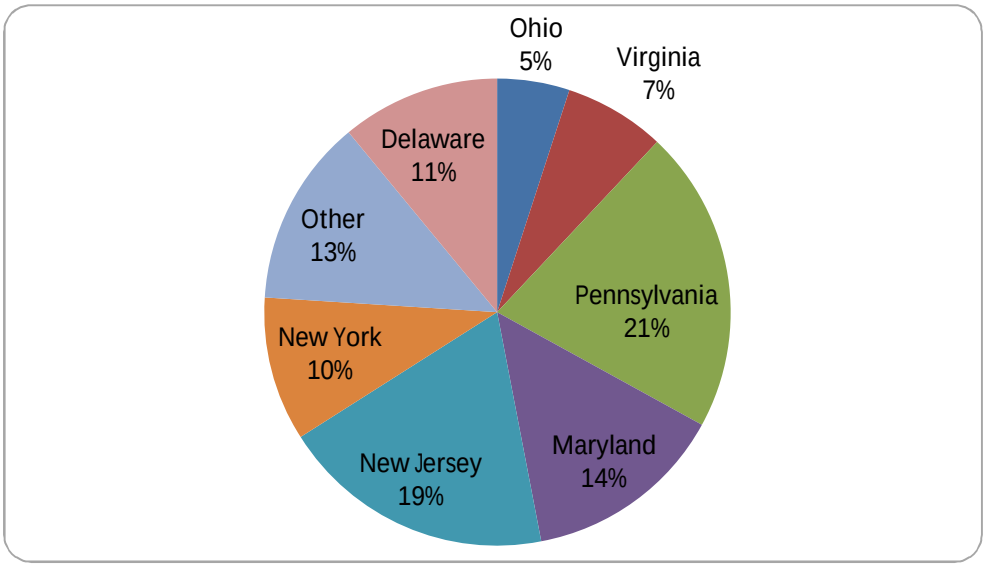


Source: Equation Research, Ocean City, MD Travel Trends, September 2011

[30] Equation Research, Ocean City, MD Travel Trends, September 2011.

Travelers to the Delaware Coastal region are shown by state in Figure 2-7. Twenty-one percent of visitors to coastal Delaware are from Pennsylvania with another 29 percent from New Jersey and New York. Many visitors to Ocean City are traveling from similar locations as indicated in Figure 2-8. Another important origin point is South Central Pennsylvania, the "HLLY" (Harrisburg, Lancaster, Lebanon, and York) region.[31] Attracting out-of-state tourists provides an inflow of cash to Delmarva's economy. Notably, the 50 percent of visitors to Delaware beaches from New York, New Jersey, and Pennsylvania are already connected to the Amtrak rail network on the Northeast Corridor and the Keystone Line. Completing the Wilmington-Delmarva rail link could prove to be an important and effective means of increasing travel from these areas. This is also true of the visitors from Maryland and Virginia along Amtrak's Northeast Corridor line.

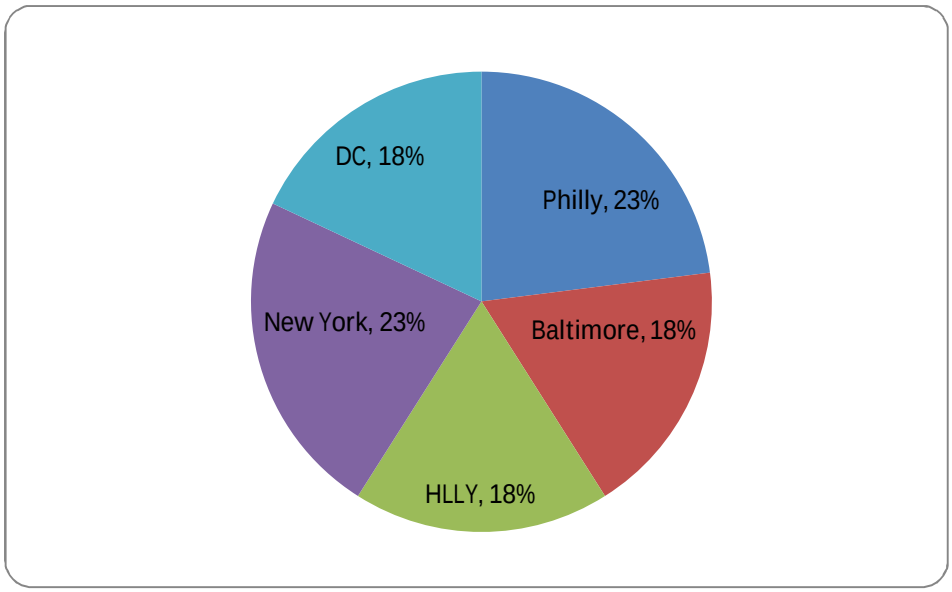
Figure 2-7 Origin State Distribution - Southern Delaware Visitors



Source: Global Insight, Southern Delaware 2010 Visitor Survey Report

[31] Ocean City Convention and Tourism

Figure 2-8 Origin Regional Distribution - Ocean City Visitors

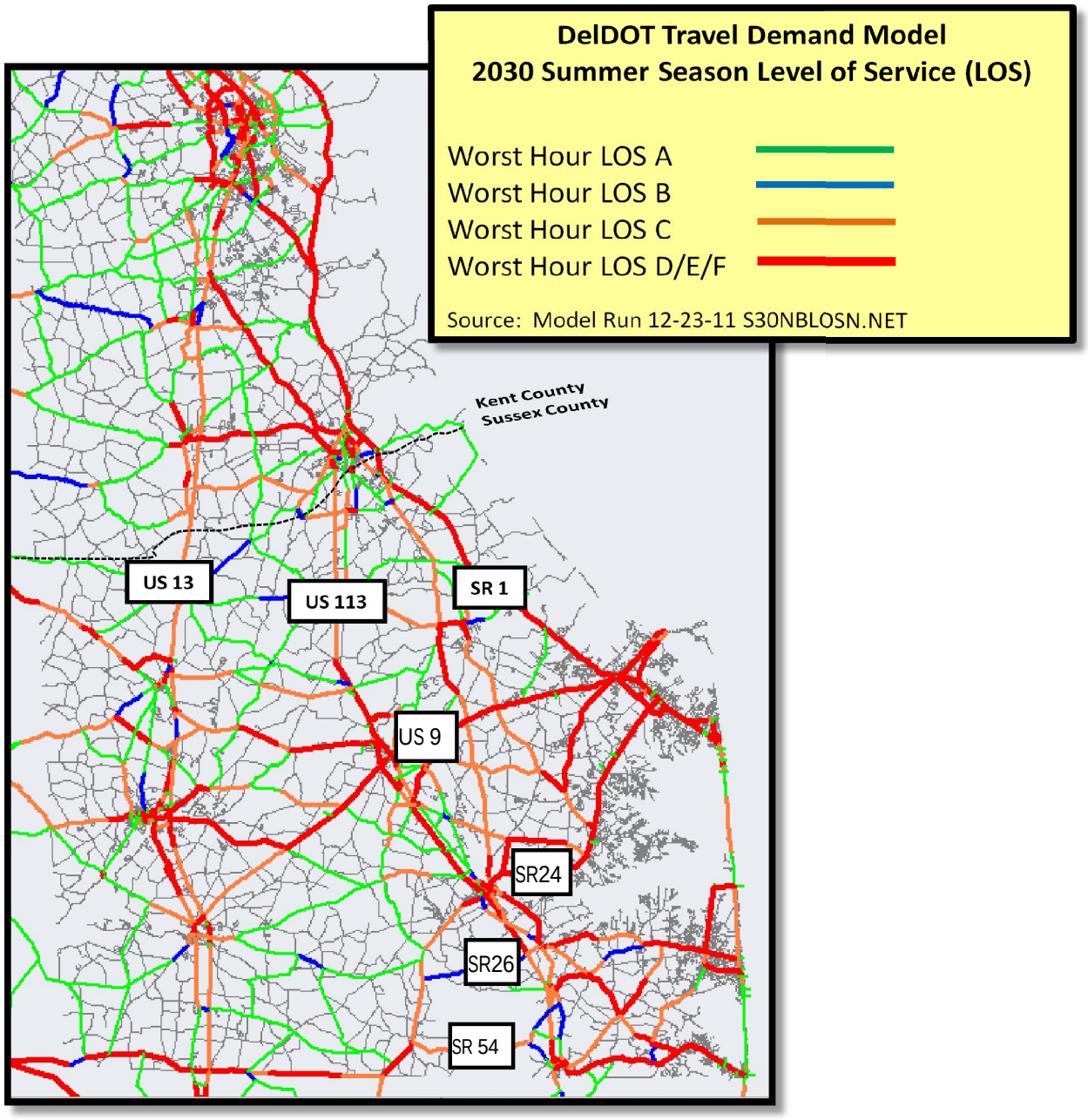


Source: Equation Research, Ocean City, MD Travel Trends, September 2011

As the travel to the Delmarva increases, roadway congestion will worsen, particularly in the summer months. According to DelDOT, a number of major roads in Kent and Sussex Counties will be at Level of Service (LOS) D/E/F by the 2030 summer season.[32] As shown in Figure 2-9, SR 1, which is a primary route to the resort areas in Delaware and Maryland from the north, will be LOS D/E/F from Dover to around Lewes. Another important route to the resort areas is US 113, which is also projected to have a poor LOS by 2030. The US 13 North/South route fairs a little better in terms of LOS but the primary East/West routes including US9, SR26, SR24 and SR54 have significant segments of roadway projected to fall into LOS D/E/F category.

[32] Level of Service is a term used to describe traffic flow conditions and is measured on a scale of A being excellent conditions to F being poor conditions.

Figure 2-9 DelDOT Travel Demand Model – 2030 Summer Season Level of Service (LOS)



Source: Delaware Department of Transportation

As shown in Figure 2-10, Maryland traffic data for the main east/west route into Ocean City also show a decreasing level of service for Route 50 in Worcester County Maryland with significant sections of roadway operating at LOS F in the summer months by 2030.

Figure 2-10 Maryland (Level of Service) LOS for Route 50 in Worcester County

County	Location Description	Road Name	Number of Lanes	LOS 2010	Summer LOS 2010	LOS 2030	Summer LOS 2030
Worcester	US 50 West of MD 818 (ATR#62)	OCEAN GATEWAY	4	A	B	A	C
Worcester	US 50-.20 MI W OF MD 452	OCEAN GATEWAY	4	A	C	A	F
Worcester	US 50-.20 MI W OF MD 611	OCEAN GATEWAY	4	A	F	B	F
Worcester	US 50-.50 MI W OF MD 528	OCEAN GATEWAY	4	B	F	B	F
Worcester	US 50 BETWEEN MD 528 (ONE WAY EB)	N DIVISION ST	2	A	D	B	F

Source: Maryland State Highway Administration, SHA Travel Forecasting and Analysis Division, 2011

An opportunity exists to support economic growth by rail serving as the impetus for public/private development opportunities near potential stations. Introducing train service as an alternative to driving may help to reduce traffic congestion, cut energy use, and improve air quality.

A large segment of the Delmarva Peninsula economy is tied to its natural environment. With ample lands for hunting, fishing and other outdoor recreational activities, it draws many tourists throughout the year. Camping, biking, and trail based recreation tourism alone was estimated to generate over 11,000 jobs through the region and contribute $1.07 billion a year to the economy.[33] The area is known for its scenery and many festivals that are held throughout the year including the World Championship Punkin Chuckin and Apple-Scrapple in Sussex County, Delaware and Sunfest in Ocean City Maryland, which is celebrating its 39th year. The Delmarva rail service would provide visitors an alternative travel choice as well as expand the market.

[33] Southwick Associates, The Economics Associated with Natural Areas in the Delmarva Peninsula, April 2012.

2.1 Rationale

If current demographic and tourist trends continue, the Delmarva region will experience significant travel growth over the next two decades, leading to an increase in traffic and congestion. Tourism and out of state visitors contribute significantly to the economy of Delmarva, especially during the summer vacation season. The continued economic health of Delmarva depends on the ability of travelers to reach the beach and vacation communities along the shore, but rising gas prices and the continued increase in congestion on the Peninsula and on the roads leading to the mainland will make travel to Delmarva beaches a less attractive option within the Northeast in the future. Addressing travel demand needs and providing new means of transportation will continue to make traveling to Delmarva's beaches attractive to tourists, and continue to bring in the visitors that support the local economy.

Interest in passenger rail transportation is growing across the country as traveling by train becomes increasingly attractive. Amtrak and commuter rail operators across the Northeast have set repeated ridership records in the past several years. Rising gas prices and increased traffic make rail transportation the preferred method of commuting for more people every day. Growing populations in urban centers are more frequently choosing rail not only for daily commuting but for longer trips as well. Individuals, cities, states, and the Federal government are looking at rail as a plausible alternative for the travel demand needs of the future. There is currently capacity along the NS freight line to allow for passenger service as well as expected growth in freight traffic with a reasonable level of infrastructure improvements.

The proposed Delmarva rail service is a response to the trends as well as meets the purpose and need of improved mobility on the peninsula. Moreover, the service addresses several of the rail transportation goals outlined in the Delaware State Rail Plan and the Maryland Transportation Plan.

Delaware State Rail Plan:

The goals of the recently completed Delaware State Rail Plan include the following in meeting the state's vision of maintaining and improving its multimodal transportation system. The proposed passenger service specifically addresses:

> Goal: *Preserve the existing network and provide additional rail capacity to maintain and improve Delaware's important link in regional and national rail networks.*

The Delmarva Intercity Rail Service, which would operate over the NEC or connect with other NEC services, would expand passenger rail capacity allowing for travel south through the State of Delaware and into Maryland. This regional service would provide travel alternatives to the private automobile for the significant population currently not served by rail. In addition, the proposed service would improve Delaware's linkages to the national rail network. Future service would be designed to help ensure that freight rail capacity on the Delmarva and NEC is protected.

> Goal: *Work with other states and stakeholders to advance improvements in rail transportation through partnerships and innovative funding opportunities.*

The Delmarva Intercity Rail Service would be a multi-state effort aimed at expanding current passenger rail alternatives in States of Delaware and Maryland. Throughout the planning process the States have worked together to address establishing a rail service that would be convenient and cost-effective.

Maryland Transportation Plan:

In keeping with the goals of the 2009 Maryland Transportation Plan this service would address several of the state's objectives and strategies to expand and improve its multimodal transportation system to increase connectivity and foster economic development opportunities.

> Objective: *Facilitate linkages within and beyond Maryland to support a healthy economy.*

The Delmarva Intercity Rail Service would meet the mobility requirements of the southern part of the state linking its population to the greater Northeast and Mid-Atlantic as well as providing improved access to the state. Spending by out-of-state visitors is a major contributor to the economy of the upper and lower Maryland Eastern Shore regions. Introduction of passenger rail transportation furthers the objective of broadening the state's transportation linkages to bolster the state economy.

> Objective: *Strategically expand network capacity to manage growth*.

The Delmarva Intercity Rail Service would expand the passenger transportation network within the state of Maryland. The Maryland Transportation Plan recognizes the need for MDOT to 'continue to consider a balance of investments across highways, transit, rail, and non-motorized options.' The proposed service would contribute to this modal balance.

3 Identification of Alternatives

3.1 Base Case

Today the motor vehicle is the primary mode of travel on the Delmarva. Four major highways connect the Delmarva to other regions: US Route 13 Chesapeake Bay Bridge-Tunnel, US Route 50/301 Chesapeake Bay Bridge, I-95/Route 1, and I-295/US Route 40 Delaware Memorial Bridge. The Chesapeake Bay Bridge-Tunnel between Norfolk and Virginia Beach links the southern tip of the Delmarva Peninsula with the Virginia mainland. The Chesapeake Bay Bridge connects the Maryland Eastern shore to Annapolis, with highway connections to Baltimore and Washington. This is the fastest route between the central and southern Delmarva to Washington, D.C. The route, however, can become very congested during peak commuting hours and the summer vacation season.

Figure 3-1 Map of Highway Route

Sources: DELDOT, FRA, FHWA, Maryland SHA

Interstate 95, the major highway along the Eastern Seaboard, passes through Northern Delaware and Wilmington. The Delaware Memorial Bridge connects Wilmington and I-95 to I-295 and the New Jersey Turnpike. Both I-95 and the Delaware Memorial Bridge offer connections to Philadelphia, New York, and the greater northeast.

Delaware State Route 1 is the major north/south road within Delmarva, connecting I-95 to Dover, Lewes, and Rehoboth Beach. US Route 13 is another important north-south road, connecting Dover and State Route 1 to the southern points of Delmarva and the Chesapeake Bay Bridge-Tunnel. US Route 50 offers a northwest-southeast connection from the Chesapeake Bay Bridge to Ocean City, Maryland.

3.1.1 Automobile

Current travel to the Delmarva region is typically done via private automobile. The approximate number of miles, drive time, and estimated cost to travel by private automobile to Berlin, Maryland are presented in Figure 3-2 below.

Figure 3-2 Driving Times and Costs

	Miles	Drive Time	Estimated Cost*
Philadelphia to Berlin	142	2 hr 40 min	$84.63
New York to Berlin	228	4 hr 16 min	$135.89
Washington D.C. to Berlin	141	2 hr 51 min	$84.04

**AAA Composite Average Costs Per Mile (Driving 15,000 miles per year) – 59.6 cents per vehicle for 2012.*

The average cost per mile includes all motor vehicle operating and ownership costs.

3.1.2 Intercity Bus

Several companies offer intercity bus services in the study area. Greyhound Lines, Inc. operates routes connecting New York, Baltimore, and Washington, D.C. with locations in Delaware and Maryland on the Delmarva Peninsula. Three major routes serve Delmarva, with routes between (1) Wilmington and Norfolk, (2) Wilmington and Ocean City via Baltimore, and (3) Washington, D.C. and Ocean City. Greyhound also operates a joint service with the Bay Runner Shuttle Company to provide a second Baltimore - Ocean City route that serves locations on the Delmarva, BWI airport, and the Baltimore bus terminal. Several other companies have offered service to the Delmarva and the beach resort areas in past years but have since ceased to offer these routes. Figure 3-3 describes the intercity bus routes serving the Delmarva. All prices and miles are end-to-end.

Figure 3-3 Delmarva Intercity Bus Services

Carrier	Stops in Region	To/From	Trips	Time	Fare	Miles	Cost Per Mile
Greyhound[1]	Wilmington, Dover, Bridgeville, Salisbury, UMES, Oak Hall, Exmore, Norfolk	New York City	2 daily 4 on Fridays and Sundays	5 hr 55 min	$52	242	$0.21
Greyhound	Ocean City, Salisbury, Easton, Annapolis, Washington D.C.	Washington D.C.	Daily except Tuesdays	3 hr 35 min	$34	147	$0.23
Greyhound[2]	Wilmington, Baltimore, Annapolis, Easton, Cambridge, Vienna, Mardela Springs, Salisbury, Ocean City	New York City	Daily except Wednesdays	7 hr 16 min	$30	208	$0.14
Greyhound Bay Runner Shuttle (BRS)[3]	Baltimore, BWI, BWI Amtrak, Kent Island, Easton, Cambridge, Salisbury, Ocean Pines	Baltimore	4 daily	3 hr 30 min	$104	133	$0.78
Bay Runner Shuttle[4]	Baltimore or BWI, Kent Island, Easton, Cambridge, Salisbury, Ocean Pines, Ocean City	Baltimore	4 daily	3 hr 40 min	$104	137	$ 0.76

Notes:

1. *Only three stops on Sundays at Exmore, Oak Hall, and UMES*
2. *No return trip from Ocean City*
3. *Stops in Easton, Cambridge, and Salisbury are roadside, not station stops*
4. *Baltimore bound shuttle stops only to pick up passengers; Delmarva bound shuttle stops only to discharge Passengers*

3.1.3 Regional Bus

3.1.3.1 Delaware Bus Service - DART

DART routes serve a number of locations on the Delmarva connecting with intercity transportation services.

Year Round Services

Buses operate in and around downtown Wilmington and Newark, and in the greater New Castle County area, with connections to the SEPTA and Amtrak train stations and the University of Delaware. Bus routes also connect New Castle County to Pennsylvania, Dover, and Elkton. In addition, buses serve downtown Dover and the surrounding area in Kent County, with continuing connections to Smyrna,

Harrington, and Milford/Georgetown. Sussex County also has its own bus network, with a central transit hub in Georgetown and bus routes connecting to Lewes, Rehoboth, Bridgeville, Seaford, and Laurel.

Resort Transit Service[34]

During the summer season (late May to mid-September), DART operates the Route 305 Beach Connection from Wilmington, Christiana Mall, Smyrna Rest Stop, Dover Park & Ride, and Milford to Rehoboth Park & Ride. At the Rehoboth Park & Ride, connections can be made to the Resort Transit Service, which provides access to beach destinations the Rehoboth Beach Boardwalk, Dewey Beach, Lewes, Long Neck, Ruddertowne, Bethany Beach, South Bethany Beach, Fenwick Island, and Ocean City.

Travel times for the service from the Rehoboth Park & Ride are two hours to Wilmington, and 45 minutes to Ocean City. To make the bus journey from Wilmington to the beach destinations a traveler must transfer at the Rehoboth Park & Ride and the wait time for the transfer must be added to the overall journey time. The service is very unattractive from the perspective of the larger northeast market as travelers to Washington or New York would require at least two transfers and upwards of six hours to reach their destination.

3.1.3.2 Maryland Bus Service

Beach Bus[35]

Beach Bus, operated by Ocean City Transit, provides service along the Coastal Highway with a varying schedule depending on the season. Fares are $3.00 for an all day pass or $1.00 per boarding. Buses travel from South Division Street to/from 144 Street.

Shore Transit[36]

The Shore Transit bus company provides service in Somerset, Wicomico, and Worcester counties in Maryland, with stops in Salisbury, Ocean City, Ocean Pines, Berlin and the US Route 50 corridor, Newark (MD), Snow Hill and Pocomoke, and Fruitland, Princess Anne (U of M Eastern Shore), Westover, Marion Station, Crisfield, and the US Route 13/MD Route 413 corridor. The service operates over ten routes on weekdays and Saturdays, and an eleventh Sunday-only route. The service operates from four to sixteen times a day. Shore Transit service began in 2004 with the merging of the public transit services in the three counties under the Tri-County Council for the Lower Eastern Shore of Maryland (TCC). A seven day unlimited pass is $25 and the passes can be refilled.

MUST Bus[37]

The Maryland Upper Shore Transit company serves Caroline, Dorchester, Kent, Queen Anne's, and Talbot Counties. Nine routes serve the region, one route provides demand response to eligible Queen Anne's County residents, and an additional six weekday and three weekend buses serve the City of

[34] http://dartfirststate.com/information/programs/beachbus/index.shtml
[35] http://oceancitymd.gov/Public_Works/transportation.html#bus
[36] www.shoretransit.org
[37] www.MUSTBUS.org

Easton. Some buses run up to hourly and most provide park & ride connections from stores and other locations near the main roads.

3.1.4 Ferry Service

Ten ferries serve the Delmarva, four public and six private. The largest operation is the Cape May-Lewes Ferry. It is a public ferry operated by the Delaware River and Bay Authority (DRBA) between Cape May, NJ, and Lewes, DE. The Cape May Ferry crosses the Delaware Bay year round. The summer price of the ferry is $10.00, or $44.00 with a car. The ferry, which avoids more than 170 driving miles, carried 920,000 riders in 2009,[38] but is down from 1.028 million riders in 2006.[39]

Four additional, but less operationally significant, ferries operate in northern Delmarva. Whitehaven and Upper ferries are operated by Wicomico County, MD, and they cross the Wicomico River in Somerset and Salisbury, respectively. Both ferries are free and operate year round. The Whitehaven ferry replaces 31 miles of driving, and the Upper Ferry saves 13. The Oxford-Bellevue Ferry operates across the Tred Avon River between Oxford and Bellevue, MD. This privately owned ferry is the one of the oldest, privately owned, operational ferries in the country. The ferry operates between April and November and costs $3 or $11 with a car. This ferry saves 20 miles of driving. DelDOT operates the Woodland Ferry in Seaford, DE across the Nanticoke River. It is a free, public ferry that operates year round and carries cars.

Figure 3-4 Upper Delmarva Ferry Service

Name	To/From	Water Body	Operator	Type	Operation	Driving Miles Saved
Cape May-Lewes Ferry	Lewes, DE – Cape May, NJ	Delaware Bay	DRBA	Public	Year Round	172
Woodland Ferry	Seaford, DE – Seaford, DE	Nanticoke River	DelDOT	Public	Year Round	2.1
Oxford-Bellevue Ferry	Oxford, MD – Bellevue, MD	Tred Avon River	Oxford-Bellevue Ferry	Private	April-November	20.8
Upper Ferry	Salisbury, MD – Salisbury, MD	Wicomico River	Wicomico County	Public	Year Round	13
Whitehaven Ferry	Whitehaven, MD – Somerset County, MD	Wicomico River	Wicomico County	Public	Year Round	31.4

Of these ferry services, the most important to the regional access to the Delmarva is the Cape May-Lewes Ferry, which offers a year round, car-capable, and time-competitive connection to the Northeast.

[38] DelDOT Delaware Transportation Facts 2009.
[39] DelDOT Delaware Transportation Facts 2006.

This is the only ferry that would be considered an alternative travel route for Delmarva visitors from the north, but its location at the southern tip of New Jersey means that for most travelers, a Wilmington based route is still the shortest option.

3.2 Rail Alternatives

The northern endpoint of the study corridor is the Davis Interlocking (MP PW 38.4) in Newark, DE on Amtrak's Northeast Corridor New York - Washington Main Line. Davis is the connection between the Northeast Corridor and the Delmarva Secondary owned by NS. From there, the study corridor follows the Delmarva Secondary to one of three possible termination points to the south: (1) West Ocean City, MD, (2) Berlin, MD (nearest point on existing rail lines to Ocean City), and (3) Lewes, DE.

The proposed Delmarva service south of Harrington, DE follows the Indian River Secondary alignment. An alternative route south of Harrington is to continue down the Delmarva Secondary, with freight lines running past Salisbury, Maryland to Pocomoke, MD. This alignment, however, would require major improvements to support passenger rail operations especially south of Seaford, DE. The terminus locations studied were mainly Berlin, MD and West Ocean City, MD. Two alternatives were examined for a route to West Ocean City, one following the abandoned rail alignment east from Berlin to the mainland coast, the other following US Route 50. The US Route 50 option includes both a highway median alignment and north side parallel alignment. The potential West Ocean City alignments have been confined to the mainland and do not extend to Ocean City due to resort's location on a barrier island.

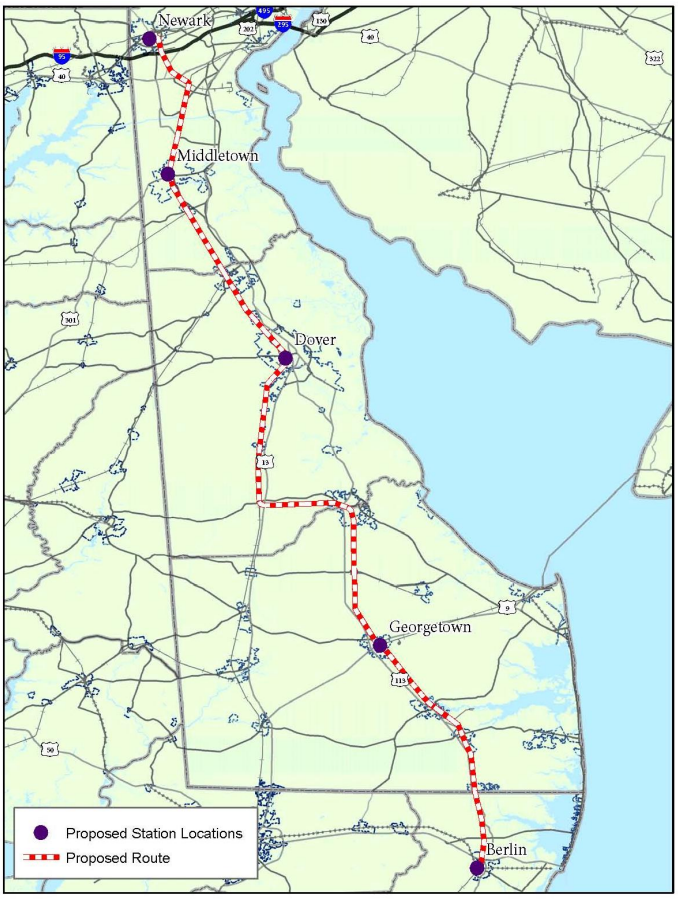
- West Ocean City
  Beach and shore tourism, along with summer seasonal visits, make up the majority of travel to the region from outside the Delmarva, with Ocean City a popular destination. A terminus close to the popular beach resort was considered to account for this travel interest with benefits of potential mode-shift and attractiveness as an alternative to crowded beach-bound highways. Challenges include the last-mile from the train to Ocean City or nearby resort towns, logistics for passengers with extra luggage, and the necessity of building a new rail alignment in a rapidly developing area. The abandoned rail alignment is primarily obstacle-free, although parts have been sold. They are used for private uses or have been built on by private owners or utility companies.

- Berlin
  Berlin is approximately 6.5 miles from Ocean City. It is attractive as a terminus as the rail line is in place. As an alternative to direct service closer to the beaches, the Berlin terminus is much less costly than an extension to West Ocean City. However, many riders either originate or are ultimately destined to the coast and would need to find some other form of transportation whether it be a bus, taxi or to rent a car to reach their final destination. The longer distance to the beach towns presents an extended version of the last-mile problem of the West Ocean City

terminus. The Berlin terminus could be a less attractive alternative to driving due to the need to travel on heavily congested US Route 50 to reach the ocean side resorts.

- Lewes
  Lewes, Delaware, was also looked at as an option, relying on existing track from Georgetown. This location, however, would limit the market potential offered by beach bound or tourist traffic. The market for this service would be those traveling for shorter stays at the coast, retirees in the Delmarva region looking to visit relatives and possibly for some business travel. This alignment is shorter and thus less costly to rehabilitate or reconstruct.

Figure 3-5 Delmarva Intercity Passenger Rail Route - Delmarva Segment



Although a single alignment down the spine of the Delmarva was identified for the service, 21 different service alternatives were developed reflecting Delmarva terminus, service frequency, target NEC market, time of day, and other scheduling features. All but one option had its Delmarva terminus in either Berlin, Maryland or West Ocean City, Maryland. This one option incorporated Lewes, Delaware as the end of the line.

Figure 3-5 outlines each alternative. All options include Newark. Options with four stations include Middletown, Dover, Georgetown, and Berlin; options with five stations extend to West Ocean City. The

Lewes terminus option includes Middletown, Dover, Georgetown, and Lewes. Trains per day is the number of trains each day in all directions - four trains, for example, represents two inbound and two outbound trains.

Figure 3-6 Rail Alternatives

Option	Service (Delmarva Departure Times)	One-Way Trains per Day	Service Category	Stations	WAS Trains	NYP Trains	Average Travel Time WAS	Average Travel Time NYP
Weekend 1A Berlin	1RT/day to NYP (5:30am)+ 1RT/day from NYP (3pm) + 1RT to WAS (7am)	6	Weekend	4	2	4	3:50	4:38
Weekend 1B WOC	1RT/day to NYP (5:30am)+ 1RT/day from NYP (3pm) + 1RT to WAS (7am)	6	Weekend	5	2	4	3:58	4:46
Weekend 1C (Fri-Sun)	1x/day to NYP (4:30pm)	2	Weekend	4	0	2	4:26(a)	4:38
1A Berlin	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	6	High Weekday	4	2	4	3:50	4:38
1B WOC	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	6	High Weekday	5	2	4	3:58	4:46
2A Berlin	1RT/day to WAS (6:30am)	2	Low Weekday	4	2	0	3:50	4:45(a)
2B WOC	1RT/day to WAS (6:30am)	2	Low Weekday	5	2	0	3:58	4:53(a)
3A Berlin	1RT/day to NYP (5:30am)	2	Low Weekday	4	0	2	4:26(a)	4:38
3B WOC	1RT/day to NYP (5:30am)	2	Low Weekday	5	0	2	4:34(a)	4:46
4A Berlin	1RT/day to NYP (5:30am) + 1RT/day to WAS (9:30am)	4	Medium Weekday	4	2	2	3:50	4:38
4B WOC	1RT/day to NYP (5:30am) + 1RT/day to WAS (9:30am)	4	Medium Weekday	5	2	2	3:58	4:46
5	1RT/day to LEWES TO NYP/WAS (6am; 7am)	4	Medium Weekday	Lewes	2	2	3:31	4:11
6A Berlin	1RT/day to WAS (10am)	2	Low Weekday	4	2	0	3:50	4:55
6B WOC	1RT/day to WAS (10am)	2	Low Weekday	5	2	0	3:58	5:03
7A Berlin	1RT/day to NYP (9:30am)	2	Low Weekday	4	0	2	4:28(a)	4:38
7B WOC	1RT/day to NYP (9:30am)	2	Low Weekday	5	0	2	4:36(a)	4:46
8A Berlin	1RT/day to WAS (4pm)	2	Low Weekday	4	2	0	3:50	4:45(a)

Option	Service (Delmarva Departure Times)	One-Way Trains per Day	Service Category	Stations	WAS Trains	NYP Trains	Average Travel Time WAS	Average Travel Time NYP
8B WOC	1RT/day to WAS (4pm)	2	Low Weekday	5	2	0	3:58	4:53(a)
9A Berlin	1RT/day to NYP (4:30pm)	2	Low Weekday	4	0	2	4:11(a)	4:38
9B WOC	1RT/day to NYP (4:30pm)	2	Low Weekday	5	0	2	4:19(a)	4:46
10A Berlin	1RT/day to NYP (4:30pm) +1RT/day to WAS (11am)	4	Medium Weekday	4	2	2	3:50	4:38
10B WOC	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	4	Medium Weekday	5	2	2	3:58	4:46

(a) Cross-platform transfer
(SB) Designates southbound as the morning trip direction

The service options are presented as weekend and weekday reflecting two distinct markets. In practice, trains would most likely operate seven days each week as a combination of a weekend alternative with any one of the weekday alternatives.

Options 1 through 7 consist of northbound trains departing the Delmarva in the morning with return service in the evening. Options 8 and 9 comprise trains leaving NYP or WAS in the morning for the Delmarva locations and northbound evening trains. Option 10 is a mix with a morning northbound departure for WAS from the Delmarva and a morning southbound departure from NYP. The reverse occurs in the evening.

Several alternatives involve a cross-platform transfer in Newark to serve both Washington and New York. Alternatives that include only a direct train from Delmarva to NYP serve the Washington market by a transfer to a southbound train at Newark. Conversely, alternatives that present direct service to WAS provide a cross-platform transfer at Newark to reach stations to the north on the NEC.

4 Ridership and Revenue Projections

Demand and revenue forecasts were developed by Amtrak using its proprietary intercity ridership model. The forecasts are based on population, employment, and demographic changes and trends. The Amtrak intercity model, the standard model used to develop forecasts for all proposed new Amtrak services, does not account for seasonal vacation attractions or seasonal differences in population, thus it does not measure seasonal variations in demand.

4.1 The Model

The Amtrak proprietary intercity demand model considers the demographic characteristics of the proposed station areas and the factors influencing the attractiveness of train travel, including train speed, trip time, time of day, frequency, and cost. The Delmarva service ridership estimates were based upon the following:

- Stations in Middletown, Dover, Georgetown, and Berlin
- Additional station in West Ocean City for selected options
- Dedicated shuttle bus service to West Ocean City for alternatives terminating in Berlin
- Year-round service
- Forecast year 2030
- Baseline NEC-segment schedules from Amtrak's 2030 Master Plan
- Two fare scenarios – a high fare of $0.28 per mile and a low fare of $0.14 per mile.
- Schedules and times of travel based on speed and a 'no meet' time table, where freight and passenger train operations have no timing conflicts requiring passing tracks

Limitations of the Amtrak model prevented estimating internal Delmarva ridership. Only trips between Delmarva the NEC are included in the ridership projections. With respect to internal NEC trips, these were not considered, as they, for the most part, would not be incremental riders.

4.2 Ridership Summary

Based on the above assumptions, passenger service parameters such as price, time of train departures and length of journey, the estimated total travel demand between Delmarva and the markets represented by Northeast Corridor stations was estimated. For the purpose of summarizing the ridership and revenue estimates, the 21 options have been categorized by service level. The categories of service are described in Figure 4-1.

Figure 4-1 Service Level Summary

Service Level	Service Description
Weekend	Weekend-only service with one WAS round trip and two NYP round trips
Low	Weekday-only service with one WAS or one NYP round trip
Mid	Weekday-only service with one WAS round trip and one NYP round trip
High	Weekday-only service with one WAS round trip and two NYP round trips

4.2.1 Ridership Estimates

The high fare scenarios each produced ridership estimates within 92 percent of the low fare scenarios suggesting that demand is price-inelastic at this range of fares. The model also produced comparable ridership estimates for the Berlin terminus and West Ocean City terminus options. Ridership estimates for the two station options were consistently within a few percentage points of each other across comparable service levels and fare structures indicating some passenger indifference to transferring to a shuttle service.

4.2.2 Weekend Service Alternatives:

The weekend-only options were modeled reflecting direct service to New York City Penn Station (NYP) and Union Station in Washington, D.C. (WAS) with three inbound trains and three outbound trains: two trains to and from New York and one Washington train in each direction. The weekend-only services offered daily round trip capabilities. For the weekend options, the ridership demand estimates remained relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare).

4.2.3 Low Service Level Alternatives:

The low-level service level weekday-only options were modeled to reflect a single daily train in each direction between WAS and Delmarva or a single daily train in each direction between NYP and Delmarva. Selected options included the capability to connect easily at Newark with a NEC train to travel in the opposite direction of Delmarva direct service. For example, a traveler to New York could take the Delmarva Washington train to Newark with a transfer to a northbound NEC train. Options vary by time of day with the service offering the ability to make a round trip connection on Delmarva or, in Washington or New York, directly or through a connection. The ridership estimates remain relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). As would be expected, the low service level, shown in Figure 4-2, produces the least ridership. Train load factors, however, are the highest among the service levels.

Figure 4-2 Service Level Ridership Projections (2030 Forecast Year)

Service Level	Ridership Estimates	Passengers per Train
Weekend	37-000-50,000*	75-100*
Low	60,000-80,000	115-160
Mid	70,000-90,000	70-90
High	130,000+	85

Source: Amtrak; Parsons Brinckerhoff Calculations

4.2.4 Mid Service Level Alternatives:

The mid level weekday-only service category comprises options that include bi-directional operations connecting Delmarva with both WAS and NYP. The range of options varies by time of day and whether

the schedule permits passengers to make a one-day roundtrip to the Delmarva or to Washington and New York. The ridership estimates remain relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). The mid-level category also includes the option with Lewes as a terminus.

As shown in Figure 4-2, the mid service level options moderately increased the total ridership. Offering two direct services is more attractive to the market than a service connecting Delmarva to either WAS or NYP, with a transfer required for travel in the opposite direction on the NEC. The increase in ridership, however, is not sufficient to avoid a decrease in load factors on the trains.

4.2.5 High Service Level Alternatives

The high level of service options were modeled with one round trip to or from WAS and two round trips to or from NYP per day. Options vary by time of day and whether the trains offer the ability to make a round trip connection in Delmarva or in Washington or New York. As with the other service levels, the ridership estimates remain relatively constant regardless of the terminus (Berlin or West Ocean City) or fare structure (high-fare and low-fare). The high service level options demonstrate the greatest market capture with train load factors not much less than the mid-service level alternatives.

4.2.6 Alternatives Analysis - Ridership

Ridership estimates were developed for each option with the high and low fare levels. Appendix VII presents the revenue and ridership projections for each option at each fare level. The following tables summarize the ridership for the higher fare scenario. Figure 4-3 presents the five options with the highest ridership projections (the ridership estimates are provided for both terminal location scenarios).

Figure 4-3 Ten Highest Ridership Alternatives: Annual Ridership (2030)

Option	Delmarva Terminus	Annual Ridership
Option1A	Berlin	128,500
Option1B	WOC	130,000
Option4A	Berlin	83,900
Option4B	WOC	85,500
Option7A	Berlin	75,600
Option7B	WOC	76,600
Option10A	Berlin	74,000
Option10B	WOC	75,700
Option9A	Berlin	70,800
Option9B	WOC	71,800

Source: Amtrak

Option 1 weekday service offers the greatest annual ridership by virtue of its being a six train per day operation. This is followed Option 4 with four daily trains operating. The difference in ridership between

Option 4 with direct trains to Washington and New York, and the next best, Option 7 with two daily trains serving the New York market and a cross-platform transfer to travel Washington demonstrates that an additional train in this market does not significantly increase ridership. Option 10 consists of a morning southbound train from NYP along with a late morning northbound train to WAS, with the reverse in the evening. Option 9 is a two-train operation -- a morning departure from NYP with an evening return.

Figure 4-4 provides a different perspective on ridership. The metric, riders per train, provides a measure of capacity utilization. The Option 7 (morning service to NYP) demonstrates the greatest levels of capacity utilization followed by Option 9 (afternoon service to NYP) and Option 66 (morning service to WAS). The figure shows that while the West Ocean City options have higher projected ridership densities, the additional station does not materially increase ridership.

Figure 4-4 Five Highest Ridership Alternatives: Riders per Train (2030)

Option	Riders per train	Annual Trains	Annual Ridership
Option7B	148	520	76,600
Option7A	146	520	75,600
Option9B	138	520	71,800
Option9A	136	520	70,800
Option6B	133	520	68,900

Source: Amtrak; Parsons Brinckerhoff Calculations

Figure 4-5 provides another viewpoint on ridership density. Of the top five options, the only West Ocean City alternative that falls into the top five is 7B. The other four options have Berlin as a terminus: Option 7A (morning service to NYP), Option 9A (afternoon service to NYP), Option 6A (morning service to WAS), and Option 8A (afternoon service to WAS).

Figure 4-5 Five Highest Ridership Alternatives: Riders per Train Mile

Option	Riders per Train Mile	Annual Train Miles	Annual Ridership
Option7A	1.253	60,320	75,600
Option7B	1.188	64,480	76,600
Option9A	1.174	60,320	70,800
Option6A	1.122	60,320	67,700
Option8A	1.116	60,320	67,300

Note: Train miles are miles attributable to the Delmarva segment operation; riders are passengers boarding or disembarking on the Delmarva
Source: Amtrak; Parsons Brinckerhoff Calculations

As a comparison, Figure 4-6 shows the ridership per train-mile for selected state-supported Amtrak services. Of the four routes compared, each of the proposed Delmarva options presented earlier in

Figure 4-4 has higher ridership densities than each of services presented in Figure 4-6 other than Amtrak's Downeaster service.

Figure 4-6 Amtrak Routes: Riders per Train Mile

Route	Riders per Train Mile	Annual Train Miles	Annual Ridership
Downeaster	1.258	430,700	541,757
Keystone	0.886	1,603,992	1,420,392
Piedmont	0.637	255,500	162,657
Vermonter	0.247	332,880	82,086

4.2.7 Alternatives Analysis - Ridership: Daily Service

The preceding section examined ridership for two separate market segments, weekend travel, and weekday travel. The former is dominated by pleasure journeys while the latter represents principally business travel. Combining the ridership of both markets provides a broader perspective on the market potential of a Delmarva passenger rail service. In practice, the weekend service can be combined with any of the weekday options; however, combining the ridership of the Saturday-Sunday service with the highest volume weekday service provides a perspective on the maximum ridership of the Delmarva service. A seven day per week Berlin service comprising three round trips per day on Saturdays and Sundays (45,500 annual riders) with the highest performing week day service, Option 1A (128,500 annual riders) results in 174,000 riders, exceeding both the Piedmont and Vermonter.

4.3 Revenue

Revenue projections (Figure 4-7) were developed for each of the demand options, and are based on the combination of ridership and fares. The fare structures (high-fare, low-fare) were based on a per-mile ticket price, so overall revenue estimates depended upon the distance between the origin and destinations of each trip. The ridership demand estimates remain reasonably constant across the two fare scenarios. Consequently, the high fare scenario produces measurably more revenue due to the evident price inelasticity.

Figure 4-7 2030 Service Level Revenue Projections

Service Level	Low-Fare Scenario Revenue	High-Fare Scenario Revenue
Weekend	$2.3 million	$2.7 million
Low	$3.1-$4.0 million	$3.7-$4.7 million
Mid	$4.1 million	$4.9 million
High	$6.6 million	$7.7 million

Source: Amtrak

Figure 4-8 lists the five alternatives projected to produce the largest revenue. Option 1 with three daily trains in each direction produces the greatest revenue followed by Option 4 with its morning departure round trip service to both NYP and WAS, and Option 7 with a round trip to NYP and cross platform transfer to WAS.

Figure 4-8 Five Highest Alternatives: Total Revenue (2030)

Option	Revenue	Annual Ridership
Option1B	$6,011,000	139,904
Option1A	$5,910,000	128,504
Option4B	$3,901,000	85,502
Option4A	$3,784,000	83,902
Option7B	$3,744,000	76,602

Source: Amtrak

Figure 4-9 and Figure 4-10 describe the options with the most revenue per train and revenue per train mile.

Daily service, combining the weekend and weekday services, increases the Delmarva revenue. The scenario of daily service from Berlin that incorporates Option 1A produces $5.1M in revenue.

Figure 4-9 Five Highest Alternatives: Revenue per Train (2030)

Option	Revenue per train
Option7B	$7,200
Option7A	$7,067
Option9B	$6,773
Option9A	$6,635
Option6B	$6,315

Source: Amtrak; Parsons Brinckerhoff Calculations

Figure 4-10 Five Highest Alternatives: Revenue per Train Mile (2030)

Option	Revenue per train mile
Option7A	$60.93
Option7B	$58.06
Option9A	$57.19
Option9B	$54.62
Option6A	$52.83

Note: Train miles are miles attributable to the Delmarva segment operation; revenues are total trip revenue allocated to the Delmarva segment
Source: Amtrak; Parsons Brinckerhoff Calculations

5 Operations Analysis

5.1 Inventory

The railroad line from Davis to the shore consists of three segments:

1. Delmarva Secondary—Davis to Harrington: 56.3 miles

There are no signals on the Delmarva Secondary. Trains on the Delmarva Secondary are dispatched from Harrisburg. Train operations on the Delmarva Secondary are governed by DCS Rules (a form of train control system where dispatchers issue authorities to trains using a written form) or Rule 93 Yard Limits, between Alley, MP 61.0, and Jack MP 67.0, where the Delmarva Secondary connects with the Indian River Running Track. Under Yard Rules, trains may proceed at restricted speed, not to exceed 5 mph, with train crews' manually monitoring opposing train moves and obstructions.

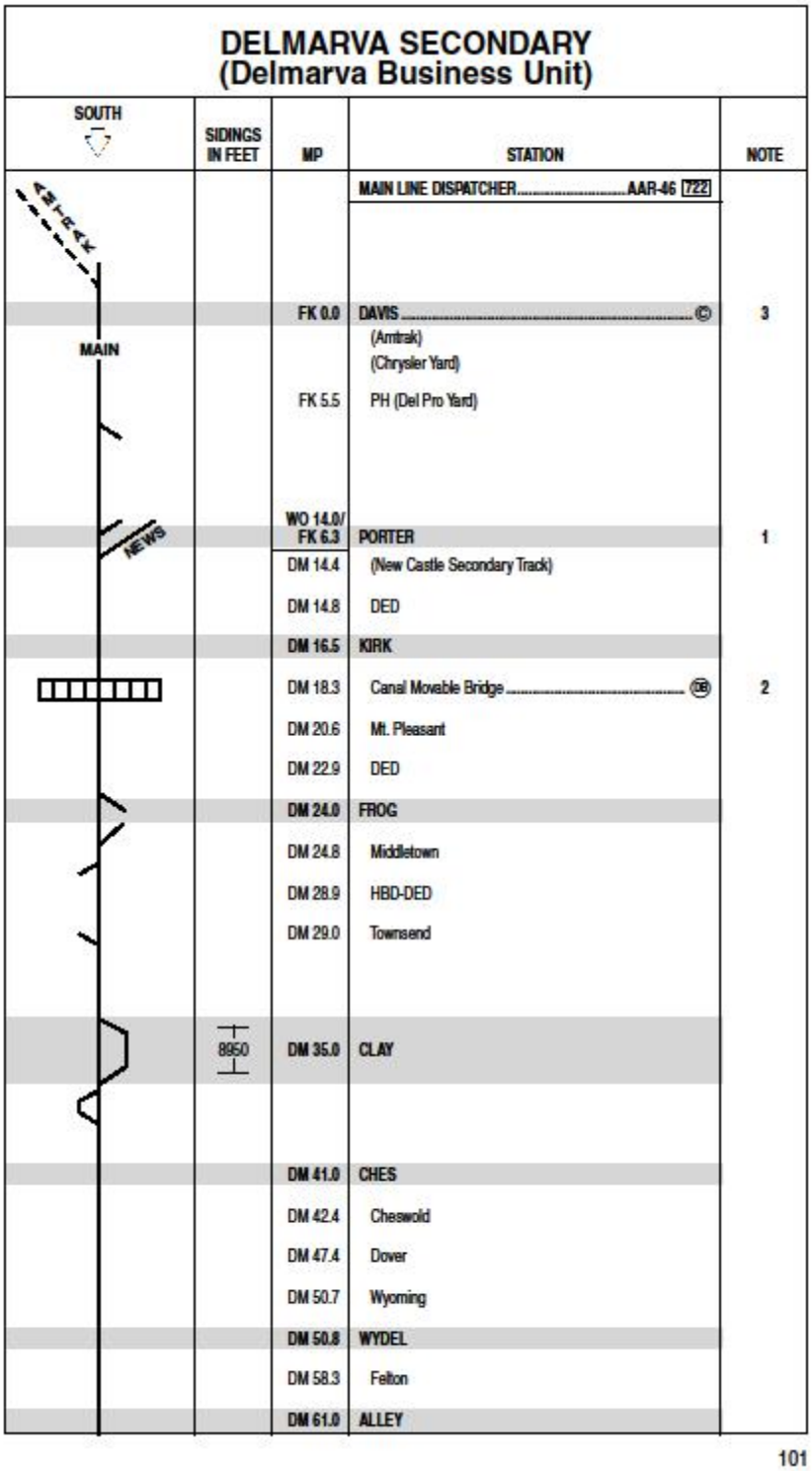
The railroad between Newark (Davis) and Harrington is a single track. Maximum train speed is nominally 60 mph for passenger trains, 40 mph for freight. More than 95 percent of the track is in the FRA Class 3 category or higher. Approximately 34 industries are located on the line, served by eight industrial sidings.

At the present time, the Delmarva Secondary is limited to equipment weighing 273,000 pounds or less. As a point of comparison, the current dual-mode (overhead electric and diesel) New Jersey Transit ALP-45 DP's weigh 284,000 lbs when fully loaded with fuel.

There are 61 public grade crossings on the line, all having warning devices. Approximately 22 of them are protected by gates. The line has 28 private crossings, one with gates.

Figure 5-1 shows the configuration of a portion of the line between Davis and Alley.

Figure 5-1 Rail Line between Davis and Alley



DELMARVA SECONDARY
(Delmarva Business Unit)

SOUTH	SIDINGS IN FEET	MP	STATION	NOTE
			MAIN LINE DISPATCHER.....AAR-46 722	
		FK 0.0	DAVIS ..... ©	3
MAIN			(Amtrak)	
			(Chrysler Yard)	
		FK 5.5	PH (Del Pro Yard)	
		WO 14.0/ FK 6.3	PORTER	1
NEWS		DM 14.4	(New Castle Secondary Track)	
		DM 14.8	DED	
		DM 16.5	KIRK	
		DM 18.3	Canal Movable Bridge ..... ⓒⓑ	2
		DM 20.6	Mt. Pleasant	
		DM 22.9	DED	
		DM 24.0	FROG	
		DM 24.8	Middletown	
		DM 28.9	HBD-DED	
		DM 29.0	Townsend	
	8950	DM 35.0	CLAY	
		DM 41.0	CHES	
		DM 42.4	Cheswold	
		DM 47.4	Dover	
		DM 50.7	Wyoming	
		DM 50.8	WYDEL	
		DM 58.3	Felton	
		DM 61.0	ALLEY	

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Key locations on this portion of the line are:

Porter: This location is considered yard limits with radio-controlled switches. All movements must be made at restricted speed not exceeding five mph. The switches at Porter are not interlocked to prevent a conflicting route to be lined. NS believes consideration should be given to upgrading this area to a signaled, interlocked junction to reduce delays to passenger movements. Radio controlled switches are only approved for use within yard limits, so the method of operation would need to be upgraded to higher main line standards if the yard limits were eliminated.

C&D Canal: The bridge is operated by NS under the direction of the Coast Guard. Maritime traffic has the right of way over rail traffic; trains can and do incur delays due to the bridge. Consideration of this interference should be incorporated into any passenger train schedule. Train speed on the bridge is restricted to 25 MPH.

Clay: The siding at Clay is often used to store trains, and is not suitable for planned meets between trains.

Dover: The siding at Dover is used for picking up and dropping off freight cars by through trains, and to store trains when Harrington yard is congested. The siding should not be considered available as a location for trains to meet.

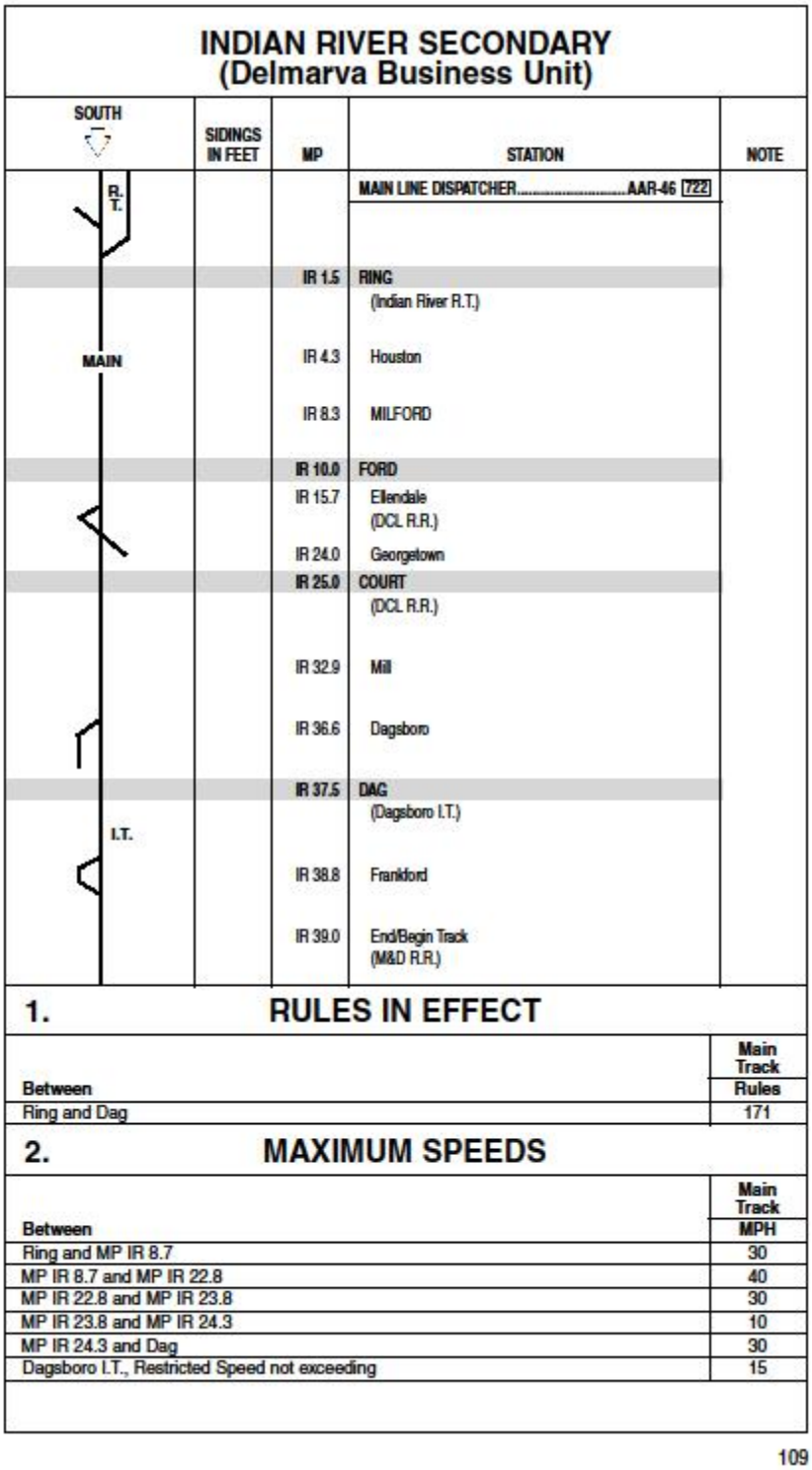
Harrington: Harrington is within yard limits, which govern train movements through the area. All switches, including the connection to the Indian River Secondary, are hand operated. There is no main line route through Harrington that can be used to bypass yard operations. Trains are assembled and disassembled on the main track, which could interfere with passenger train operations. To avoid the potential of substantial delay at Harrington due to local switching, a bypass track would need to be constructed or the existing track reconfigured.

2. Indian River Running Track/ Secondary Track (Harrington to Frankford)-- 38.8 miles

Similar to the Delmarva Secondary, the line is remotely controlled from Harrisburg and has no signal system. Train operations on the Indian River Secondary are conducted under DCS Rules between Harrington and Dagsboro, MP 37.5, the point the Indian River Secondary connects with the Maryland and Delaware Railroad. Maximum authorized speed based on FRA track classification is 30 mph for passenger trains, 25 mph for freight. The Indian River Running Track and secondary has authorized weights of 286,000 lbs per car.

Figure 5-2 shows the configuration of the Indian River Secondary.

Figure 5-2 Rail Line Indian River Secondary



INDIAN RIVER SECONDARY
(Delmarva Business Unit)

SOUTH	SIDINGS IN FEET	MP	STATION	NOTE
R. T.			MAIN LINE DISPATCHER.....AAR-46 722	
		IR 1.5	RING (Indian River R.T.)	
MAIN		IR 4.3	Houston	
		IR 8.3	MILFORD	
		IR 10.0	FORD	
		IR 15.7	Ellendale (DCL R.R.)	
		IR 24.0	Georgetown	
		IR 25.0	COURT (DCL R.R.)	
		IR 32.9	Mill	
		IR 36.6	Dagsboro	
		IR 37.5	DAG (Dagsboro I.T.)	
I.T.		IR 38.8	Frankford	
		IR 39.0	End/Begin Track (M&D R.R.)	

1. RULES IN EFFECT

Between	Main Track Rules
Ring and Dag	171

2. MAXIMUM SPEEDS

Between	Main Track MPH
Ring and MP IR 8.7	30
MP IR 8.7 and MP IR 22.8	40
MP IR 22.8 and MP IR 23.8	30
MP IR 23.8 and MP IR 24.3	10
MP IR 24.3 and Dag	30
Dagsboro I.T., Restricted Speed not exceeding	15

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Indian River Secondary: NS will often store trains manned by crew whose permissible hours of service have expired until the crews can return to work the next business day. This practice would be an

impediment to passenger train operations. In addition, there are no locations on the Indian River Secondary where trains can meet.

3. Snow Hill Line —Frankford to Berlin: 12.4 miles

Operated by the Maryland and Delaware Railroad (MDDE) the railroad between Frankford, Delaware and Berlin, Maryland is a single track. Part of MDDE's Snow Hill Line, four miles of this segment are in Delaware and 8.4 miles in are Maryland. Maximum train speed is nominally 15 mph for passenger trains, 10 mph for freight. The entire track segment is FRA Class 1.

Currently, the Snow Hill Line is limited to equipment weighing 263,000 pounds or less. Of the 22 public grade crossings on the line, approximately 19 have warning devices, but none have gates. The line also has five private crossings, with none protected by gates.

Preliminary estimates of improvement costs are presented in Chapter 7. Should development of the service proceed, Delmarva and affected NEC train operations would be analyzed using a rail operations simulation model to identify specific choke points and evaluate potential infrastructure remedies.

5.2 Freight Operations

Freight traffic on the Delmarva lines is dominated by three commodities: coal, miscellaneous freight, and oil. Coal moves in dedicated unit trains to a specific customer. The coal customers are located on the Delmarva Secondary and the Indian River Secondary. In addition, oil is relatively new traffic to the Port of Wilmington. Like coal, it moves via unit trains with all the cars destined for a single consignee.

One or two freight trains transporting a mix of commodities serve the Delmarva each weekday originating at Newark or Wilmington. Trains start at either location as a line from each enters the Delmarva joining at Porter.

Freight traffic is expected to grow on the Delmarva. An increase in trains will introduce a greater potential for operating conflicts between freight and passenger trains.

5.3 Passenger Operations

Amtrak developed a 2030 concept schedule as a component of the NEC Master Plan's Service Development Plan. The Amtrak plan comprises three daily round-trip trains to Berlin, MD: one daily round trip to/from Washington and two daily round trips to/from New York. In the Amtrak conceptual schedule, the Washington train departs from Berlin in the mornings on weekdays, and returns in the evening from DC; however this schedule inverts on Saturdays and Sundays, allowing for day trips to the shore. The two New York route trains provide morning and evening departures from each terminal daily.

The Amtrak concept schedule became this project's template for development of a service plan and represented a full-build alternative for passenger service on the Delmarva Peninsula. The other alternatives had less service or different endpoints. Considerable attention was given to avoiding meets on the Delmarva Peninsula to maintain a fluid operation.

Figure 5-3 Conceptual AMTRAK Schedule

NEC MASTER PLAN CONCEPTUAL WORKING SCHEDLES

EASTERN SHORE CORRIDOR

2010 - No Service

2018 - No Service

2030 SCHEDULE

Read Down Daily 3051		Read Down Daily 3053		Miles fr. New York	Mile Post	NEW YORK TO OCEAN CITY Station Frequency Train Number	Read Up Ex Sa,Su 3050		Read Up Sa,Su Only 3052		Read Up Daily 3054	
Lv	**7:10 A**	Lv	**4:10 P**	0	0.0	**NEW YORK, NY**	Ar	**11:40 A**	Ar	**1:15 P**	Ar	**8:00 P**
S	**7:27 A**	S	**4:27 P**	10	8.8	**Newark, NJ** (Penn Sta)	S	**11:21 A**	S	**12:56 P**	S	**7:41 P**
S	7:32 A	S	4:32 P	13	11.5	Newark Airport, NJ	S	11:16 A	S	12:51 P	S	7:36 P
S	7:42 A	S	4:42 P	24	23.2	Metro Park, NJ	S	11:06 A	S	12:41 P	S	7:26 P
S	8:06 A	S	5:06 P	58	56.7	Trenton, NJ	S	10:42 A	S	12:17 P	S	7:02 P
	8:31 A		*5:31 P*	91	89.5	**PHILADELPHIA, PA**	S	**10:17 A**	S	**11:52 A**	S	**6:37 P**
S	**8:34 A**	S	**5:34 P**		1.5			*10:14 A*		*11:49 A*		*6:34 P*
S	**8:57 A**	S	**5:57 P**	116	26.8	**Wilmington, DE**	S	**9:51 A**	S	**11:26 A**	S	**6:11 P**
	9:07 A		*6:07 P*	128	38.9	**Newark, DE**	S	9:41 A	S	11:16 A	S	6:01 P
S	9:12 A	S	6:12 P		FK0.0			*9:36 A*		*11:11 A*		*5:56 P*
	9:20 A		*6:20 P*	134	FK6.3	*Porter*		*9:28 A*		*11:03 A*		*5:48 P*
	9:34 A		*6:34 P*	146	DM18.3	*Canal MB*		*9:14 A*		*10:49 A*		*5:34 P*
S	9:44 A	S	6:44 P	153	DM24.8	Middletown, DE	S	9:04 A	S	10:39 A	S	5:24 P
S	**10:13 A**	S	**7:13 P**	175	DM47.4	**Dover, DE**	S	**8:35 A**	S	**10:10 A**	S	**4:55 P**
S	10:35 A	S	7:35 P	192	DM64.4	Harrington, DE	S	8:13 A	S	9:48 A	S	4:33 P
S	11:05 A	S	8:05 P	216	IR24.0	Georgetown, DE	S	7:43 A	S	9:18 A	S	4:03 P
	11:23 A		*8:23 P*	231	IR38.8	*Frankford*		*7:25 A*		*9:00 A*		*3:45 P*
Ar	**11:48 A**	Ar	**8:48 P**	244	MD13.0	Berlin, MD -	Lv	**7:00 A**	Lv	**8:35 A**	Lv	**3:20 P**
					via bus service	**OCEAN CITY, MD**						

Read Down M - F 3057		Read Down Sa,Su Only 3059		Miles fr. OCM	Mile Post	OCEAN CITY TO WASHINGTON Station Frequency Train Number	Read Up M - F 3056		Read Up Sa,Su Only 3058		Read Up	
					via bus service	**OCEAN CITY, MD**						
Lv	8:30 A	Lv	4:30 P	0	MD13.0	Berlin, MD -	Ar	9:14 P	Ar	12:30 P		
	8:45 A		*4:45 P*	13	IR38.8	*Frankford*		*8:59 P*		*12:15 P*		
S	*9:05 A*	S	*5:05 P*	28	IR24.0	Georgetown, DE	S	*8:39 P*	S	*11:55 A*		
S	9:35 A	S	5:35 P	52	DM64.4	Harrington, DE	S	8:09 P	S	11:25 A		
S	**9:58 A**	S	**5:58 P**	69	DM47.4	**Dover, DE**	S	**7:46 P**	S	**11:02 A**		
S	10:26 A	S	6:26 P	91	DM24.8	Middletown, DE	S	7:18 P	S	10:34 A		
	10:34 A		6:34 P	98	DM18.3	*Canal MB*		7:10 P		10:26 A		
	10:49 A		*6:49 P*	110	FK6.3	*Porter*		*6:55 P*		*10:11 A*		
Lv	**10:55 A**	Lv	**6:55 P**	116	FK0.0 38.9	**Newark, DE**	Lv	**6:52 P**	Lv	**10:08 A**		
S	11:11 A	S	7:11 P	143	65.5	Aberdeen, MD	S	6:36 P	S	9:52 A		
S	11:25 A	S	7:25 P	161	84.0	Martin Airport, MD	S	6:22 P	S	9:38 A		
S	**11:38 A**	S	**7:38 P**	173	95.7	**Baltimore, MD**	S	**6:08 P**	S	**9:25 A**		
S	11:53 A	S	7:53 P	184	106.3	BWI, MD	S	5:48 P	S	9:05 A		
S	12:07 P	S	8:07 P	204	127.0	New Carrollton, MD	S	5:30 P	S	8:47 A		
Ar	12:20 P	Ar	8:20 P	193	136.4	**WASHINGTON, DC**	Lv	5:30 P	Lv	8:47 A		

4:38	NYP to Ocean City	3:50	WAS to Ocean City (Hrs : Mins)
4.63	*decimal equivalent*	3.83	*decimal equivalent*
53	Average speed (mph)	50	Average speed (mph)

Source: AMTRAK, NEC Master Plan, 2010

5.4 Passenger Train Equipment

Passenger cars would be drawn from the Amtrak pool of equipment for the Northeast Corridor. Amtrak, in conjunction with their Delaware and Maryland partners, would procure, maintain, and operate the equipment following the requirements of Amtrak for state-supported equipment.

The Delmarva trains would operate with push-pull equipment drawn by a dual mode locomotive. This type of locomotive is currently not operational and would have to be built for this service.

New Jersey Transit operates a dual mode locomotive, the ALP45DP. In its current configuration, its operating speed presents some concern for its use on the Northeast Corridor. For use on the Delmarva Secondary, its weight poses a concern, but a modified locomotive could be developed. The same holds true for the control or cab cars necessary for the push-pull operation.

The standard consist for each train set on the Delmarva, which would also provide capacity for passengers traveling only on the NEC, would include:

- Dual mode locomotive
- Three Amfleet I Capstone Coach—70 seats each
- Amfleet I All Table Dinette
- Cab Control Car—70 Seats

A locomotive is estimated to cost $6.5 million and each coach car is estimated to cost $4.25 million. Locomotives could be purchased or leased. Were Amtrak to convert its NEC trains to dual locomotives, the Delmarva service could share in the locomotive pool, compensating Amtrak on the basis of use as many other services. The coaches and food service cars could be drawn from the Amtrak pool reimbursing Amtrak in an amount equivalent to the amortization of the capital cost of the equipment. The total cost of each train set is estimated at $27.8 million. Each daily round trip would require a set of these cars.

6 Station Profiles

6.1 Station Locations

The Delmarva Intercity Passenger service would use the NEC with trains leaving the corridor at Newark for the Delmarva Secondary. Plans are currently in place to build a Newark intermodal transit center near the existing train station, which would serve the Delmarva passenger trains. Up to five additional new stations would support the service: Middletown, Dover, and Georgetown with terminal stations in either Berlin or West Ocean City, Maryland.

The intermediate stations along the line would be built as "basic stations" consisting of canopied platforms with shelters. The estimated cost of this type of station, including signage, lighting, landscaping and approximately 50 parking spaces is $2.0-$2.5 million per station, considering ADA requirements. A 2000-foot passing siding would be installed at each intermediate station near the platform.

Middletown

The proposed location of the Middletown station was identified in the Downstate Commuter Rail Alternatives Analysis study from 2005. The station would be located off SR 71 along the rail in the Northern portion of Middletown, not far for the former Middletown Train Station.[40]

Dover Station

Two locations are being considered for the Dover station. One is between Division Street and Lookerman Street/Forest Ave. The location is approximately one mile from the Delaware State Capital building and many other State Agency buildings. It is near the old PRR station just south of Lookerman Street. The former station was renamed the George V. Massey Station in 2000 and is now used for public business including education-related state agencies. An alternative site would be in proximity to the Dover Transit Center on Water Street between Queen and West streets.

Georgetown Station

The proposed Georgetown Station would be located off Deposit Street near the current Georgetown Transit Hub and Park and Ride. This location is less than a half of mile from the Town Hall and Georgetown Circle. A new bus stop location as well as additional parking has been proposed near the station.

Terminus Station - Berlin/West Ocean City

The proposed Berlin station would be located along the rail line between Harrison Avenue and Main Street. Two new parking locations and a new bus stop are proposed near the station.

Two possible locations are under consideration for the West Ocean City Station location with the eventual location dependent on the alignment that is chosen. One location is at the intersection of

[40] DMJM Harris/AECOM, Downstate Commuter Rail Alternatives Analysis, Volume II – Alternatives Analysis Report

Stephen Decatur Highway and Sunset Avenue. The alternative is located off Route 50 not far from the bridge crossing the inlet into Ocean City.

The terminal station at either Berlin or West Ocean City would have an enclosed waiting room with ticketing capability. The grounds would have at least 50 parking spaces. This estimate would be slightly higher at $5 million. If the terminus were West Ocean City, Berlin would have a basic station similar to others on the route.

6.2 Station Operations

Only the terminal stations on the Delmarva would require staffing, which could be met with volunteers. Ticketing would be conducted using ticketing machines or Amtrak's recently released smart phone technology. Station maintenance would be contracted to local service providers.

6.3 Intermodal Connectivity

Newark Station

The current DART bus routes that serve the Newark train station include Route 59 (Mid-day rail Shuttle) and Route 65 (Newark/Elkton). The Mid-Day Shuttle operates one round trip during the times SEPTA trains do not serve stations south of Wilmington. Route 65 includes locations such as the University of Delaware, business parks and the Newark Transit Hub. The SEPTA Wilmington/Newark line also operates 17 trains each day to and from the station with AMTRAK operating two trains each weekday and four trains on the weekend.

Middletown Station

DART bus routes the currently serve the Middletown area include Route 43 Middletown – Odessa and the intercounty Route 301 which travels from Wilmington to Dover.

Dover Station

Several DART bus routes are located near station with current stops on W Division St (Routes 100, 101, 102) and Lookerman St. (Routes 102,113). These routes serve various locations throughout Kent County including the Water Street Transfer, Greentree Village Shopping Center, Delaware State University, and the Dover Mall.

Georgetown Station

This proposed station is located near the Georgetown Transit Hub on North Railroad Ave. DART bus routes 206, 212, 214 serve the transit hub. These routes connect with Sussex County locations in Lewes, Rehoboth, and Laurel. The Route 303 operates north into Kent County with a final destination in Dover.

Berlin Station

Shore Transit serves Worcester County as well as Somerset and Wicomico counties. Routes that operate in Berlin include:

- Route 431: Salisbury – Ocean City – Pocomoke
- Route 451: Salisbury-Pocomoke-Ocean City.

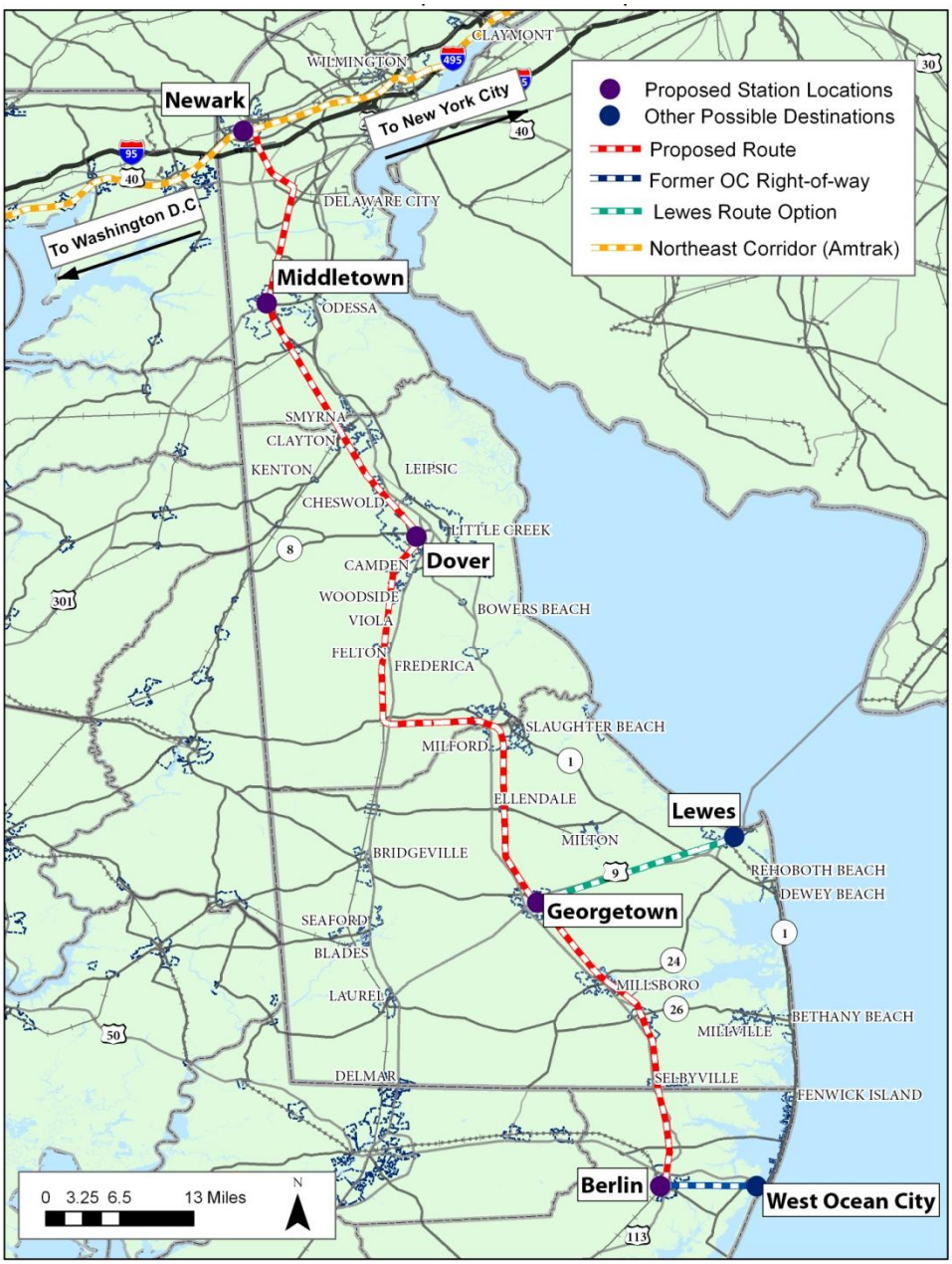
West Ocean City Station

The two shore transit routes that run near the proposed train station are Route 431: Salisbury-Ocean City-Pocomoke and Route 451: Salisbury-Pocomoke-Ocean City. There is a location for a proposed bus stop near the Stephen Decatur Highway terminus option.

7 Infrastructure Requirements

The northern endpoint of the proposed Delmarva corridor is the Davis Interlocking (MP PW 38.4) in Newark, DE on Amtrak's Northeast Corridor New York - Washington Main Line. Davis is the connection between the Northeast Corridor and the Delmarva Secondary owned by NS. From there, the study corridor follows the Delmarva Secondary to one of four possible end points to the south: (1) West Ocean City, MD, (2) Berlin, MD (nearest point on existing rail lines to Ocean City), (3) Frankford, DE (southernmost point in Delaware), and (4) Lewes, DE.

Figure 7-1 Alternatives



Sources: DelDOT, FRA, FHWA, Maryland SHA

Infrastructure improvements will principally be made on the Delmarva lines. The single improvement required on the NEC is the construction of a direct connection between the Delmarva and the NS freight yard in Newark. This connection is already planned as part of Newark Regional Transportation Center Station Improvement Project. Thus, its cost is not included in the capital program for the Delmarva passenger service. No other new infrastructure or modifications to operations on the NEC are anticipated, as the proposed service will have a minimal impact on the NEC's operating capacity.

Stations

Two types of stations will be constructed. The terminal station (Berlin or West Ocean City) would feature an enclosed waiting room with ticketing capability with at least 50 parking spaces. The second type of station would serve the intermediate locations. These stations would be would have high- level platforms with canopies and a basic shelter. Each would also have parking capacity of 50 vehicles. The terminal station is estimated to cost $5 million, while the intermediate stations are estimated to cost $2.5 million. The total cost of stations would be $12.5 million to $15 million depending on whether the terminal station is Berlin or West Ocean City.

Typical intermediate station example: AMTRA's New Buffalo, MI Station

Station Tracks

ADA compliant high-level passenger station platforms along the line will need sufficient clearance not to hinder freight operations. In addition, the Delmarva Secondary and the Indian River Secondary do not have any passing tracks that permit two trains to meet or overtake one another. Although with limited passenger service on the line, opportunities exist to effectively time-separate the trains to avoid meets, siding tracks will be required to accommodate future growth in either passenger or freight services, or both. To permit the operations of freight trains through the stations with ADA compliant platforms and to provide for train meets, a separate platform track will be built at each station. These tracks will also serve as passing sidings required for the shared passenger-freight train operations. Four passing tracks would need to be constructed at $5 million for a total cost of $20 million.

Train Control-Signal system

FRA has issued proposed regulations in response to the US Rail Safety Improvement Act of 2008 that require Positive Train Control (PTC) by 2015 on virtually all rail lines over which scheduled passenger trains operate. [41] [42]Because the Delmarva lines are to be used for regularly scheduled passenger trains, implementation of PTC is mandated. The cost of any PTC installation required for passenger operations would need to be borne by the sponsor of the passenger operation, as the line does not require PTC for the current freight operations.

Currently, the route has no signal system. This limits train speed and would adversely affect passenger train safety. The position of NS is that signaling is not necessary for freight operations on this line, but a signal system is important to ensure safe operation overall for passenger operations and prevent interference with freight train operations. To implement the Delmarva service, train control would be provided by an Automatic Block System (ABS) energized by track voltage that can thus detect broken rails and similar aberrations.[43] NS policy generally calls for at least an ABS system for territory with regularly scheduled passenger trains.

The investment in combined PTC and ABS is $550,000 per mile. The total cost of the train control system would be $65.1 million with Berlin as the Delmarva terminus and $67.9 million with service to West Ocean City.

Road Crossings

Currently 171 public and private road crossings are not protected by gates, which would be required for the passenger operation. Timing circuits on signalized road crossings would also need to be upgraded and retimed for passenger train operation. The 124 public roads would be equipped with four quadrant gates at a cost of $37.2 million and dual gates with flashing signals would be installed at the 47 private crossings at a cost of $8.7 million. The crossings would be outfitted with constant warning time technology.

Rail, Ties, and Ballast

Rail, tie, and ballast condition on both the Delmarva Secondary and Indian River Secondary will need to be improved to accommodate passenger trains operating at higher speeds. While the rail on the entire route is welded, some have been in place almost 30 years, and all rail was re-laid from other, higher-tonnage locations. Norfolk Southern maintains the line to transport current traffic levels, and often

[41] Positive Train Control (PTC) is a collision-avoidance system for monitoring and controlling train movements. In addition to train separation, a PTC system is capable of enforcing line speed, temporary speed restrictions, and wayside worker safety. Essentially, the system works through the Nationwide Differential Global Positioning System (NDGPS). The train receives information about its own location and where and how fast it may safely travel (movement authorities).

[42] Senate Bill 1462 seeks to extend the deadline until December 31, 2018

[43] Automatic Block Signaling (ABS) describes a fixed signaling system where the railroad line is divided into "blocks." (A block is the distance between two signals.) The automatic operation results from the system's ability to detect an occupancy or obstruction in the blocks ahead of the train by passing a low voltage current through the track between signals and conveying that information to trains through fixed signal indications.

timetable speeds are not reflective of existing conditions with trains operating well below the posted speed limit. Currently, nine specific slow orders are in place on the Delmarva Secondary north of Harrington, affecting approximately 15 miles of the line. Included in those slow orders are twelve miles of 25 MPH restriction and one mile of 10 MPH restriction. On the Indian River Secondary, there are three 10 MPH restrictions. The line between Frankford and Berlin operated by the MDDE will also require upgrading to accommodate passenger trains. Additional maintenance or capital costs to upgrade or maintain track conditions beyond that required to operate freight trains would be the obligation of the passenger train's sponsor.

Improvements on the 100-mile Norfolk Southern segment between Newark and Frankford are estimated to cost $851,000 per mile, for a total of 90.2 million. Improvements to the MDDE are estimated to cost $1.2 million per track mile over the 12.4 miles with a total cost of $14.9 million.

West Ocean City Extension

Although the favorable route alignment to West Ocean City includes existing right of way, constructing the line is still a significant endeavor. Figure 7-2 outlines the cost elements.

Figure 7-2 West Ocean City Extension Cost

Improvement	Unit Cost	Improvement	Unit Cost
New track on abandoned alignment	$2,185,000 per track mile	Right of Way Fencing (both sides):	$414,000 per route mile
New track alignment	$2,760,000 per route mile	Agricultural land acquisition	$21,000 to $26,000 per acre
Number 15 Turnout (From the MDDE to the new construction at Berlin)	$287,500 each	Residential land acquisition	$75,000 to $350,000 per acre
Overhead highway bridge (rail under), Rt. 50	$4,410,000 each	Commercial land acquisition	$3,267,000 to $5,227,200 per acre
Deep retained Cut Section (to get under Rt. 50)	$91,080,000 per route mile	Industrial land acquisition	$2,500,000 to $5,227,200 per acre
Controlled siding at WOC station	$12,650,000 each (1 each) to allow for two trains in the station simultaneously	Apartment Residential land acquisition	$1,750,000 to $3,500,000 per acre
Drainage allowance	$16,515,150 per route mile	Apartment Commercial land acquisition	$3,500,000 to $5,000,000 per acre
Clearing and demolition	$848,700 per route mile	Design/contract management	20%
Utilities Modification allowance	$1,092,500 per route mile	Design contingency	25%

Figure 7-3 summarizes the infrastructure upgrades and cost.

Figure 7-3 Estimated Infrastructure Costs ($Millions)

	Berlin Terminus	West Ocean City Terminus
Stations, Platforms and Parking	$13	$16
Passing Sidings and Track Improvements	$125	$125
Train Control and Signals	$65	$68
Grade Crossing Protection	$46	$46
Construction Berlin - WOC		$200
Maintenance Facility	$16	$16
Design/Contract Management	$38	$92
Other/Contingency	$57	$138
Initial Capital Investment	$360	$700

Added to this is would be the $27.8 million estimated cost per train set.

8 Feasibility Analysis

This section provides an assessment of the feasibility of the Delmarva service by examining its financial performance. It describes projected operating and maintenance costs for proposed intercity rail service between Washington Union Station and/or New York Penn Station and one of three destinations on the Delmarva Peninsula: Ocean City, MD, Berlin, MD, and Lewes, DE. While the service alternatives represent both through operations to Washington and/or New York, and cross-platform train changes, costs and revenue are presented only for the portion of the journey between Newark, DE and locations on the Delmarva Peninsula. The purpose of the feasibility analysis is to measure incremental revenues attributable to the Delmarva service against the cost of providing the service.

8.1 Cost Methodology and Assumptions

To establish feasibility, high-level costs were developed from comparable operations. Figure 8-1 provides a comparison of two representative Delmarva service options with the benchmark operation. For the purpose of assessing feasibility, 2030 has been selected as the forecast year. Financial performance for each year is included as an Appendix.

Figure 8-1 Operating Parameters - Selected Delmarva Options and Benchmark Service

	2030 Projections		2012
Service Parameter	Option 1A	Option 2B	Benchmark Service
Annual Ridership	128,500	63,500	88,800
Route Miles	116	124	206
Directional Trains Per Day Total	6	2	2
Annual Train Miles	180,960	64,480	150,380
Annual Train Trips	1,560	520	730
Average Ridership Per Train	82	122	122
Annual Car Miles	904,800	322,400	451,140
Stations	5	4	7

Operating and maintenance costs were calculated for each of the service options. These options vary based on the end point (Ocean City, Berlin, Lewes), service characteristics (time of day, frequencies) and/or days of operation (weekend, weekday). Figure 8-2 displays the service parameters for each of the options.

Figure 8-2 Service Parameters for 22 Delmarva Service Options (2030)

	Weekend1A	Weekend1B	Weekend1c	Option1A	Option1B	
Annual Ridership	45,501	45,801	37,867	128,504	139,904	
Route Miles	116	124	124	116	124	
Directional Trains Per Day	6	6	2	6	6	
Annual Operating Days	104	104	156	260	260	
Annual Trips	624	624	312	1,560	1,560	
Annual Train Miles	72,384	77,376	38,688	180,960	193,440	
Average Ridership Per Train	73	73	121	82	90	
Cars Per Train	5	5	5	5	5	
Annual Car Miles	361,920	386,880	193,440	904,800	967,200	
Stations	4	5	4	4	5	
	Option2A	Option2B	Option3A	Option3B	Option4A	Option4B
Annual Ridership	63,002	63,502	59,602	59,902	83,902	85,502
Route Miles	116	124	116	124	116	124
Directional Trains Per Day	2	2	2	2	4	4
Annual Operating Days	260	260	260	260	260	260
Annual Trips	520	520	520	520	1,040	1,040
Annual Train Miles	60,320	64,480	60,320	64,480	120,640	128,960
Average Ridership Per Train	121	122	115	115	81	82
Cars Per Train	5	5	5	5	5	5
Annual Car Miles	301,600	322,400	301,600	322,400	603,200	644,800
Stations	4	5	4	5	4	5
	Option5	Option6A	Option6B	Option7A	Option7B	
Annual Ridership	61,902	67,702	68,902	75,602	76,602	
Route Miles	89	116	124	116	124	
Directional Trains Per Day	4	2	2	2	2	
Annual Operating Days	260	260	260	260	260	
Annual Trips	1,040	520	520	520	520	
Annual Train Miles	92,560	60,320	64,480	60,320	64,480	
Average Ridership Per Train	60	130	133	145	147	
Cars Per Train	5	5	5	5	5	
Annual Car Miles	462,800	301,600	322,400	301,600	322,400	
Stations	4	4	5	4	5	
	Option8A	Option8B	Option9A	Option9B	Option10A	Option10B
Annual Ridership	67,302	68,402	70,802	71,802	74,002	75,702
Route Miles	116	124	116	124	116	124
Directional Trains Per Day	2	2	2	2	4	4
Annual Operating Days	260	260	260	260	260	260
Annual Trips	520	520	520	520	1,040	1,040
Annual Train Miles	60,320	64,480	60,320	64,480	120,640	128,960
Average Ridership Per Train	129	147	136	138	71	73
Cars Per Train	5	5	5	5	5	5
Annual Car Miles	301,600	322,400	301,600	322,400	603,200	644,800
Stations	4	5	4	5	5	4

Detailed annual operating and maintenance cost forecasts were developed for each year to 2038. Escalation for operating costs was assumed at an average of approximately 2.0 percent based on IHS Global Insight Consumer Price Index (CPI) projections.

Ridership forecasts were developed for the Delmarva rail service for a single out year of 2030. For the purpose of evaluating feasibility, ridership was discounted two percent per year for years prior to 2030 and grown two percent per year for years thereafter. In reality, passenger growth would not be linear, however, this assumption does not materially affect the economics of the service. All costs presented in the following section are for 2030 reported in 2030 nominal dollars.

8.2 Operating Economics

Operating costs for the options ranged from $2.9M for Option Weekend 1c, which provides one train in each direction between New York Penn Station and Berlin three days per week (Friday-Sunday), to $11.2M for Option 1B, which provides two trains in each direction between New York Penn Station and Ocean City and one train in each direction between Washington Union Station and Ocean City five days per week (Monday-Friday). These two options also represent the lowest and highest revenues with $1.9M and $6.0M respectively. Weekend 1c has an operating loss of $1.0M and Option 1B has a loss of $5.2M.

Option 7A, which provides weekday service with one train in each direction between New York Penn Station and Berlin, requires the lowest operating subsidy with an operating loss of $0.7M. A summary of costs, revenue, and required subsidy are displayed in Figure 8-3.

Figure 8-3 Cost Summary for Delmarva Rail Options (2030 $)

Option	O&M Costs	Revenue	Operating Loss Annual Subsidy	Subsidy Per Rider	Farebox Coverage
Weekend1A	$4,440,808	$2,152,000	($2,288,788)	$50.30	48%
Weekend1B	$4,656,670	$2,166,000	($2,490,802)	$54.38	46%
Weekend1c (Fri-Sun)	$2,864,809	$1,858,000	($1,006,809)		65%
Option1A	$10,640,045	$5,910,000	($4,729,626)	$36.81	55%
Option1B	$11,211,145	$6,011,000	($5,200,257)	$37.17	53%
Option2A	$4,145,456	$2,817,000	($1,328,950)	$21.09	67%
Option2B	$4,421,635	$2,868,000	($1,553,375)	$24.46	64%
Option3A	$4,097,066	$2,748,000	($1,348,628)	$22.63	66%
Option3B	$4,369,894	$2,775,000	($1,594,705)	$26.62	63%
Option4A	$7,215,887	$3,784,000	($3,431,711)	$40.90	52%
Option4B	$7,699,087	$3,901,000	($3,798,041)	$44.42	50%
Option5	$5,600,455	$2,611,000	($2,989,560)	$48.30	46%
Option6A	$4,218,979	$3,187,000	($1,032,109)	$15.24	74%
Option6B	$4,505,869	$3,284,000	($1,222,029)	$17.74	72%
Option7A	$4,339,330	$3,675,000	($664,482)	$8.79	83%
Option7B	$4,622,802	$3,744,000	($878,853)	$11.47	80%
Option8A	$4,213,310	$3,180,000	($1,033,436)	$15.36	74%
Option8B	$4,498,543	$3,265,000	($1,233,483)	$18.03	72%
Option9A	$4,267,934	$3,450,000	($817,535)	$11.55	80%
Option9B	$4,551,475	$3,522,000	($1,029,107)	$14.33	76%
Option10A	$7,068,293	$3,307,000	($3,761,199)	$50.83	46%
Option10B	$7,552,979	$3,429,000	($4,124,399)	$54.48	45%

The following tables display the five best and five worst options for several financial metrics. Figure 8-4 shows the options with lowest and highest total operating subsidy. The options with a single daily train serving the New York market require the lowest subsidy. The highest subsidies are required for services with multiple trains.

Figure 8-4 Annual Operating Subsidy - Lowest and Highest Options (2030)

Option	Description	O&M Costs	Revenue	Annual Subsidy
	Lowest			
Option7A	1x/day to NYP (9:30am)	$4,339,330	$3,675,000	$664,330
Option9A	1x/day to NYP (4:30pm)	$4,267,934	$3,450,000	$817,934
Option7B	1x/day to NYP (9:30am)	$4,622,802	$3,744,000	$878,802
Option9B	1x/day to NYP (4:30pm)	$4,551,475	$3,522,000	$1,029,475
Option6A	1RT/day to WAS (10:00am)	$4,218,979	$3,186,870	$1,032,109
	Highest			
Option10A	1x/day to NYP (7pm) + 1x/day to WAS (11am)	$7,068,293	$3,307,000	$3,761,293
Option4B	1x/day to NYP (5:30am) + 1x/day to WAS (9:30am)	$7,699,087	$3,901,000	$3,798,087
Option10B	1x/day to NYP (7pm) + 1x/day to WAS (11am)	$7,552,979	$3,429,000	$4,123,979
Option1A	2x/day to NYP (5:30am+3pm)+ 1x/day to WAS (6:30am)	$10,640,045	$5,910,000	$4,730,045
Option1B	2x/day to NYP (5:30am+3pm)+ 1x/day to WAS (6:30am)	$11,211,145	$6,011,000	$5,200,145

Normalizing the subsidy on a rider basis still favors the New York services, however, the option of a single train to Washington is one of the highest ranked alternatives as shown in Figure 8-6. The highest subsidies per passenger are required by the options with multiple trains indicating that the introduction of additional trains does not expand ridership significantly enough to offset the cost increases.

Figure 8-5 Subsidy per Rider- Lowest and Highest Delmarva Rail Options (2030)

Option		O&M Costs	Revenue	Annual Subsidy	Subsidy Per Rider
		Lowest			
Option7A	1RT/day to NYP (9:30am)	$4,339,330	$3,675,000	$664,330	$8.79
Option7B	1RT/day to NYP (9:30am)	$4,622,802	$3,744,000	$878,802	$11.47
Option9A	1RT/day to NYP (4:30pm)	$4,267,934	$3,450,000	$817,934	$11.55
Option9B	1RT/day to NYP (4:30pm)	$4,551,475	$3,522,000	$1,029,475	$14.34
Option6A	1RT/day to WAS (10am)	$4,218,979	$3,187,000	$1,031,979	$15.24
		Highest			
Option5	1RT/day to LEWES TO NYP/WAS (6am; 7am)	$5,600,455	$2,611,000	$2,989,455	$48.29
Weekend1A	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,440,808	$2,152,000	$2,288,808	$50.30
Option10A	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,068,293	$3,307,000	$3,761,293	$50.83
Weekend1B	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,656,670	$2,166,000	$2,490,670	$54.38
Option10B	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,552,979	$3,429,000	$4,123,979	$54.48

A similar pattern is exhibited by operating loss per train mile as well as farebox coverage of operating costs, shown in Figures 8-6 and 8-7 respectively.

Figure 8-6 Operating Cost per Train Mile - Lowest and Highest Delmarva Rail Options (2030)

Option		O&M Costs	Revenue	Annual Subsidy	Annual Train Miles	Subsidy Per Train mile
		Lowest				
Option7A	1RT/day to NYP (9:30am)	$4,339,330	$3,675,000	$664,330	60,320	$11.01
Option9A	1RT/day to NYP (4:30pm)	$4,267,934	$3,450,000	$817,934	60,320	$13.56
Option7B	1RT/day to NYP (9:30am)	$4,622,802	$3,744,000	$878,802	64,480	$13.63
Option9B	1RT/day to NYP (4:30pm)	$4,551,475	$3,522,000	$1,029,475	64,480	$15.97
Option6A	1RT/day to WAS (10am)	$4,218,979	$3,187,000	$1,031,979	60,320	$17.11
		Highest				
Option10A	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,068,293	$3,307,000	$3,761,293	120,640	$31.18
Weekend1A	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,440,808	$2,152,000	$2,288,808	72,384	$31.62
Option10B	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,552,979	$3,429,000	$4,123,979	128,960	$31.98
Weekend1B	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,656,670	$2,166,000	$2,490,670	77,376	$32.19
Option5	1RT/day to LEWES TO NYP/WAS (6am; 7am)	$5,600,455	$2,611,000	$2,989,455	92,560	$32.30

Figure 8-7 Farebox Coverage- Lowest and Highest Delmarva Rail Options (2030)

Option		O&M Costs	Revenue	Farebox Coverage
	Highest			
Option7A	1RT/day to NYP (9:30am)	$4,339,330	$3,675,000	85%
Option7B	1RT/day to NYP (9:30am)	$4,622,802	$3,744,000	81%
Option9A	1RT/day to NYP (4:30pm)	$4,267,934	$3,450,000	81%
Option9B	1RT/day to NYP (4:30pm)	$4,551,475	$3,522,000	77%
Option6A	1RT/day to WAS (10am)	$4,218,979	$3,187,000	76%
	Lowest			
Weekend1A	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,440,808	$2,152,000	48%
Option10A	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,068,293	$3,307,000	47%
Option5	1RT/day to LEWES TO NYP/WAS (6am; 7am)	$5,600,455	$2,611,000	47%
Weekend1B	2RT/day to NYP (5:30am+3pm)+ 1RT/day to WAS (6:30am)	$4,656,670	$2,166,000	47%
Option10B	1RT/day to NYP (7pm) + 1RT/day to WAS (11am)	$7,552,979	$3,429,000	45%

8.2.1 Daily Service

With the infrastructure improvement costs as well as equipment costs fixed, the introduction of daily service will only increase the total operating costs offset by increased revenues. Figure 8-8 shows the operating expense, revenue, and operating subsidy required by a seven day a week service.

Figure 8-8 Daily Service Financial Parameters (2030)

	Daily Trains	NEC Market	Riders	O&M Costs	Revenue	Annual Subsidy	Subsidy Per Rider
Option1A	6	NYP/WAS	174,005	$15,080,853	$8,062,439	$7,018,414	$40.33
Option1B	6	NYP/WAS	185,705	$15,867,815	$8,176,756	$7,691,059	$41.42
Option2A	2	WAS	85,310	$5,875,634	$3,842,013	$2,033,621	$23.84
Option2B	2	WAS	84,291	$6,258,209	$3,901,764	$2,356,446	$27.96
Option3A	2	NYP	80,706	$5,807,047	$3,749,160	$2,057,887	$25.50
Option3B	2	NYP	79,512	$6,184,977	$3,775,157	$2,409,821	$30.31
Option4A	4	NYP/WAS	115,040	$11,103,577	$5,247,555	$5,856,022	$50.90
Option4B	4	NYP/WAS	117,236	$11,777,116	$5,398,207	$6,378,909	$54.41
Option6A	2	WAS	91,674	$5,979,843	$4,347,228	$1,632,614	$17.81
Option6B	2	WAS	91,459	$6,377,431	$4,467,087	$1,910,344	$20.89
Option7A	2	NYP	102,371	$6,150,425	$5,012,882	$1,137,543	$11.11
Option7B	2	NYP	101,680	$6,542,933	$5,092,984	$1,449,949	$14.26
Option8A	2	WAS	91,299	$6,098,738	$4,321,187	$1,777,552	$19.47
Option8B	2	WAS	90,765	$6,499,914	$4,415,272	$2,084,642	$22.97
Option9A	2	NYP	96,047	$6,177,807	$4,688,809	$1,488,998	$15.50

Fifteen daily service options were developed based on the various weekend and weekday options described earlier. Option 7, with a daily train in each direction between the Delmarva and NYP would require the least subsidy with $1.1 million for Berlin service and $1.5 million for WOC service in 2030. As more trains are operated, the subsidy would exceed $7 million (Option 1). This represents

approximately a $500,000 increase over the weekday service. Option 7 also would represent the lowest subsidy per rider at $11.11 (Berlin) and $14.26 (WOC).

8.3 Project Feasibility

Several options demonstrate acceptable operating cost recovery ratios and acceptable subsidy levels. Weekday only Option 6, Option 7, and Option , have cost recovery ratios between 75 percent and 85 percent. Annual subsidies are $1 million or less depending on the option, translating to between $8.50 and $15.50 per rider. The corresponding seven day per week services have lower cost recovery ratios, however, they still range between 70 percent and 80 percent.

Figure 8-9 Top Ranking Services (2030)

Option	O&M Costs	Revenue	Annual Subsidy	Subsidy Per Rider	Farebox Coverage
Weekday Only					
Option 6A Berlin	$4,218,979	$3,187,000	$1,032,109	$15.24	74%
Option 6B WOC	$4,505,869	$3,284,000	$1,222,029	$17.74	72%
Option 7A Berlin	$4,339,330	$3,675,000	$664,482	$8.79	83%
Option 7B WOC	$4,622,802	$3,744,000	$878,853	$11.47	80%
Option 9A Berlin	$4,267,934	$3,450,000	$817,535	$11.55	80%
Option 9B WOC	$4,551,475	$3,522,000	$1,029,107	$14.33	76%
Daily Service					
Option 6A Berlin	$5,979,843	$4,347,228	$1,632,614	$17.81	73%
Option 6B WOC	$6,377,431	$4,467,087	$1,910,344	$20.89	70%
Option 7A Berlin	$6,150,425	$5,012,882	$1,137,543	$11.11	81%
Option 7B WOC	$6,542,933	$5,092,984	$1,449,949	$14.26	78%
Option 9A Berlin	$6,177,807	$4,688,809	$1,488,998	$15.50	76%

The capital investment, however, is significant. As shown in Figure 7-3, infrastructure costs would range from $360 million with a terminus at Berlin to $700 million with a terminus at West Ocean City. Purchasing of equipment would add another $27.8 million per trainset, or a $1.2 million per year increase in operating costs if the purchase price is amortized over the life of the equipment.

9 Conclusion

Several service options demonstrate acceptable ridership, farebox recovery ratios, and subsidy levels. Investment costs of $360 million and $700 million to upgrade the line, however, pose a hurdle to implementation. Should funding become available for the service, the next steps are to expand this feasibility assessment by more precisely determining the required investment through operations simulation modeling and conducting an analysis of the benefits and economic impacts to measure against the investment costs.

Delmarva Intercity Rail Feasibility Study

APPENDIX

DART
A Division of DelDOT
Getting There Starts Here

PARSONS BRINCKERHOFF

RK&K

S.L. Bassford & Associates

December 2013

Appendix I

Inventory of Existing Conditions

Delmarva Intercity Rail Study
Technical Memorandum #1
Proposed Rail Corridor

SEGMENT 7 - BERLIN, MD TO OCEAN VIEW ,MD - PROPOSED BY RAIL

RAILROAD RIGHT OF WAY				
Status of right of way Unknown				
TRACK				
Railroad Lines/Right of Way	**Norfolk Southern-Delmarva Secondary**			
% of Class 3 or higher track	0%	% of Class 2 track		0%
% of Class 1 track	0%	% of less than Class 1 track		0%
Maximum allowable operating speed	Passenger - 0	Freight - 0		
Number of active tracks				1 each
Total right of way length per segment 5.5 miles - single				5.5 mile
Number of interlockings	0 each	Number of yards		0 each
Number of industries	0 each	Number of sidings		0 each
BRIDGES				1
Total number of undergrade bridges				1 each
No. of multi track bridges	0 each	No. of single track bridges		1 each
No. of overhead bridges	0 each	Number of culverts		2 each
AT GRADE CROSSING				
Number of public crossing	8 each	Number of private crossing		3 each
% of public crossing with warning devices				0%
% of private crossing with warning devices				0%
% of public crossing with gates				0%
% of private crossing with gates				0%
RAILROAD SIGNAL SYSTEM				
Type of signal and operating system		**DCS - Manual Block Control System**		
No. of signalized interlockings	0 each	Number of signal facilities		0 each
WETLAND / ENVIRONMENTAL CONCERNS				
Number of possible wetland areas				1 each

Appendix II

Delmarva Grade Crossing

Delmarva Intercity Rail Study
Technical Memorandum #2
Inventory of "At Grade Crossing"

ALTERNATIVE B - WILMINGTON VIA NEWARK, DOVER, HARRINGTON, GEORGETOWN, FRANKFORD, DE
TO BERLIN, MD SEGMENTS 2, 3, 4, 5 **(SEGMENT 1 - SEE package of 2002)** WAR - 7.26.2012

RAILROAD RIGHT OF WAY

SEGMENT 2 **DOVER TO BERLIN**

Location/ name	AARDOT No.	Milepost	Public Crossing	Private Crossing	Protection Devices			Picture	Type of surface grade crossing	with sidewalk	Speed R	Speed at crossing		Comments
					w/Signals	w/Barriers	no protect.					Max V60mph	Max V80mph	
W Division St.	531638P	DM 47.3	o		o	o		1 to 16	Asphalt and rubber	o	30	45	45	Speed R - from charts
Forest St.	531640R	47.5	o		o	o		17 to35	Conc.panels w/rubber	o	30	30	30	
North St. Rd 73	531641X	47.7	o		o	o		36 to 59	Concrete panels	o	30	10	10	cantilever
Punchen Rn. Bridge	048.88-1MAB-18	48.88										60	80	
Private crossing		49.44		o			o	n/a	n/a			60	80	
Lindale Crk. Bridge	050.40-1MAB-24	50.4										60	80	
Front St.	531644T	50.5	o		o	o		60 to 73	Asphalt and rubber			60	80	
W Camden Wyoming Ave.	531647N	50.8	o		o	o		74 to 91	Asphalt and rubber	o	40	60	80	
Southern Blv Rd 15	531648V	50.9	o		o	o		92 to 106	Concrete panels			60	80	
Willow Grove Rd 10	531699C	52.0	o		o			107 to 123	Concrete panels			60	80	
Bison Rd 234	531650W	52.7	o		o			124 to 139	Asphalt and rubber			60	80	
Main St and Tuxedo Rd 30	531652K	54.2	o		o	o		140 to 155	Asphalt and rubber			60	80	
Private crossing		54.4		o			o	155 to 166	Ballast			60	80	
Priv. cros. Lobolly Acress		54.8		o			o	167 to 177	Asphalt and rubber			60	80	
Farm crossing		55.1		o			o	n/a	n/a			60	80	
Olin Dili Rd 236	532197X	55.4	o		o			178 to 190	Asphalt and rubber			60	80	
Fence Post Ln Rd 237	532198E	55.7	o		o			191 to 203	Asphalt and rubber			60	80	
Private crossing		55.8		o			o	204 to 211	Asphalt and rubber			60	80	
W Howard Rd 238	532200D	56.1	o		o			212 to 225	Asphalt and rubber			60	80	
W Evens Rd 32	532201K	56.2	o		o	o		226 to 238	Asphalt and rubber			60	80	
Firetower Rd 239	532202S	56.8	o		o			239 to 252	Asphalt and rubber			60	80	
Priv.cross. Poor Boys Ln		56.9		o			o	253 to 260	Asphalt and rubber			60	80	
Private crossing Dills		57.3		o			o	261 to 269	Asphalt and rubber			60	80	
Private crossing Ewerett		57.5		o			o	270 to 276	Asphalt and rubber			60	80	
Peach Basket Rd	532206V	57.8	o		o			277 to 289	Concrete panels			60	80	
Sewell St	532207B	58.3	o		o	o		290 to 301	Asphalt and rubber			60	80	
E High St	532208H	58.4	o		o			302 to 314	Asphalt and timber	o n/b	40	60	80	o n/b - (no barriers)
W Main St	532209P	58.5	o		o	o		315 to 330	Conc.panels w/rubber	o	40	60	80	
MRDRKLL RVR Bridge	059.82-1BSB-24	59.8						n/a				60	80	
Reeves Crossing Rd	532211R	60.2	o		o			331 to 342	Asphalt and rubber			60	80	
Black Swamp Crk Bridge	060.71-1DGO-43	60.7						n/a				60	80	
Paradise Alley Rd 287	532213E	60.9	o		o			343 to 356	Asphalt			60	80	
Hopkins Cemetery Rd	532214L	62.5	o		o			357 to 371	Asphalt and rubber			60	80	
Culvert	N/A	63.4						n/a				60	80	Not shown on chart
E Center St	532216A	63.9	o		o	o		372 to 395	Asphalt and rubber	o		50	60	
E Liberty St	532217G	64.3	o		o	o		396 to 414	Asphalt and rubber	o		45	45	
Clark St	532219V	DM 64.4	o		o	o		415 to 439	Conc.panels w/rubber	o		30	30	

SEGMENT 3 **HARRINGTON TO GEORGETOWN**

Location / name	AARDOT No.	Milepost	Public Crossing	Private Crossing	Protection Devices			Picture	Crossing Condition	with sidewalk	Speed R	Speed at crossing		Comments
					w/Signals	w/Barriers	no protect.					Max V60mph	Max V80mph	
East St	516094G	IR 0.5	o		o	o		440 to 472	Asphalt and timber			30	30	

Dupont Hwy US 13	516095N	0.8	o		o			473 to 499	Concrete panels			30	30	cantilever
Culvert / Bridge	N/A	1						n/a				60	60	Not shown on chart
Private Smiths		1.4		o			o	500 to 506				60	80	
Private Rd Earl St		1.6		o			o	507 to 515	Asphalt and rubber			60	80	
Messicks Rd 432	516098J	1.7	o		o			516 to 528	Asphalt and rubber			60	80	
Hunting Quarter Rd 429	516099R	2.1	o		o			529 to 542	Asphalt and rubber			60	80	
Private crossing		2.3		o			o	n/a				60	80	
Deep Grass Rd 384	516101P	3.6	o		o			543 to 555	Asphalt and rubber			60	80	
Pine St	516102W	3.95	o		o			556 to 569	Asphalt and rubber			60	80	
Broad St Rd 37	516103D	4.2	o		o			570 to 586	Asphalt and timber			60	80	cantilever
Blairs Pond Rd 444	516104K	4.9	o		o			587 to 605	Asphalt and timber			60	80	
Holly Hill Rd 447	516105S	5.8	o		o			606 to 619	Asphalt and timber			60	80	
Williamsville Rd 443	516106Y	7.2	o		o			620 to 648	Asphalt and rubber			60	80	cantilever
US 113 Dupont Blvd	516107F	7.5	o		o			849 to 876	Asphalt and rubber			60	80	cantilever
Priv. crossing Passmore		7.8		o			o	877 to 897	Asphalt and ballast			55	55	
UPPR MLFRDR Bridge	008.07-1CSB-22	8.07										55	55	
LWR MLFRDR Bridge	008.18-1DGO-44	8.18										55	55	
Causey Ave 36N	516109U	8.3	o		o	o		898 to 922	Concrete panels	o		55	55	
S Wallnut St 36S	516110N	8.5	o		o			923 to 940	Asphalt and timber	o n/b	30	60	60	
Mc Coy St	516112C	9.1	o		o			941 to 971	Asphalt and timber			60	80	cantilever
Priv. crossing Bennetts		9.9		o			o	972 to 983	Ballast and rubber			60	80	
Susquehanna Rd 213A	516114R	10.8	o		o			984 to 1000	Asphalt and ballast			60	80	
Sherman Ave. Rd 213B	516115X	10.9	o		o			1001 to 1016	Asphalt and rubber			60	80	
Johnson Rd 207	516116E	11.1	o		o			1017 to 1034	Conc.panels w/rubber			60	80	cantilever
Butler Ave. Rd 225	516117L	11.2	o		o			1035 to 1051	Asphalt and rubber			60	80	
Greely Ave. Rd 38	516118T	11.4	o		o			1052 to 1067	Asphalt and rubber			60	80	
Rd 38A /Front St	516119A	11.6	o		o			1068 to 1083	Asphalt and ballast			60	80	
Fleatown Rd	516120U	13.8	o		o			1084 to 1100	Asphalt and rubber			60	80	
Main St	516122H	15.45	o		o			1101 to1117	Concrete panels	o n/b	40	60	80	
Willow St	516123P	15.6	o		o	o		1118 to 1839	Asphalt and rubber			60	80	
State St	516124W	15.65	o		o	o		1140 to 1158	Asphalt and rubber			60	80	
E Robbins Rd . 579	516126K	18.55	o		o			1159 to 1174	Asphalt and timber			60	80	
Rarley BR Bridge	019.2-1BSO-20	19.2										60	80	
Redden Rd 565	516128Y	20.1	o		o	o		1175 to 1192	Asphalt and rubber			60	80	cantilever
Mifflin BR Bridge	020.72-1BSO-18	20.7										60	80	
Wilson Rd 244	516129F	21.95	o		o			1193 to 1208	Concrete panels			60	80	
Donovans Rd	516130A	22.4	o		o			1209 to 1222	Asphalt and timber			60	80	
Private crossing		23.0		o			o	n/a				60	80	
Pepper St	516133V	23.6	o		o			1223 to 1237	Asphalt and rubber			60	70	
Depot St	516134C	23.8	o		o			1238 to 1250	Asphalt and timber			30	30	
Cooper Alley		23.9	o				o	1251 to 1262	Asphalt and timber			25	25	Pedestrian
US 9 Lewes Hwy	516136R	24.0	o		o	o		1263 to 1275	Asphalt and rubber	o	10	10	10	
Strawberry Alley		24.05	o				o	1276 to 1285	Asphalt and rubber			10	10	Pedestrian
E Pine St	516138E	IR 24.15	o		o			1286 to 1297	Asphalt and rubber	o n/b	10	30	30	IR24.15 = DE 0.0 to Lewes

SEGMENT 4 **GEORGETOWN TO FRANKFORD**

Location/ name	AARDOT No.	Milepost	Public Crossing	Private Crossing	Protection Devices			Picture	Type of surface grade crossing	with sidewalk	Speed R	Speed at crossing		Comments
					w/Signals	w/Barriers	no protect.					Max V60mph	Max V80mph	
Railroad Av .Airport Rd	516285S	IR24.3	o		o			1298 to 1310	Asphalt and rubber	o		30	30	
Park Ave. US9 Track	516286Y	24.9	o		o			1311 to 1327	Concrete panels			60	80	
Wood Branch Rd 321	516288M	26.05	o		o			1328 to 1341	Asphalt and rubber			60	80	
Sussex Pine Rd	516289U	26.1	o		o			1342 to 1357	Asphalt and timber			60	80	
Private crossing		26.8		o			o	n/a				60	80	
Zoar Rd	516292C	27.6	o		o			1358 to 1370	Concrete panels			60	80	

Stokley Rd 432	516293J	28.1	o		o			1371 to 1384	Asphalt and rubber			60	80	
Anderson Branch Culvert	028.56-1CAB-10	28.56										60	80	
Avenue of Honor	516294H	29.8	o		o	o		1385 to 1399	Concrete panels			60	80	cantilever
Doe Bridge Ln Fire Trial		30.6	o				o	1400 to 1409	Asphalt and timber			60	80	pedestrian
Patriots Way Rd 318	516296E	30.8	o		o			1410 to1423	Asphalt and timber			60	80	
Hearns Branch Culvert	031.14-CAB-10	31.14										60	80	
Burtons Branch Bridge	031.65-1DGO-48	31.65										60	70	
W State St	516299A	31.9	o		o			1424 to 1439	Asphalt and timber			60	60	cantilever
Priv.crossing Godwin		32.1		o			o	1440 to 1448	Asphalt and timber			60	70	
Washington St	516301Y	32.52	o		o	o		1449 to 1461	Concrete panels			60	80	
Main St	516302F	32.53	o		o	o		1462 to1471	Concrete panels	o	30	60	80	
Rte 339B Willson Hwy	516303M	32.7	o		o	o		1472 to 1487	Asphalt and timber			60	80	
Old Landing Rd. CR 333	516304U	32.85	o		o			1488 to 1507	Asphalt and rubber			60	80	
Burtons Branch Culvert	033.24-1CAB-10											60	80	
Industrial St Private cros.		33.6		o			o	1508 to 1523	Ballast and timber			60	80	
Thoroughgoods Rd 333	516306H	34.5	o		o			1524 to 1540	Asphalt and rubber			60	80	
Cambell Rd 334A		35.4	o				o	1541 to 1551	Asphalt and timber			60	60	
Dagsborough Rd 20	516308W	35.8	o		o			1552 to 1563	Concrete panels			60	60	
Waterway Culvert	035.91-1CSB-14	35.9										60	70	
Clayton St	516310X	36.33	o		o			1564 to 1575	Concrete panels	o n/b	30	60	80	
Swamp Rd 406	516311E	36.5	o		o			1576 to 1591	Asphalt and timber			60	80	end of pictures
Priv. crossing Mitchell		36.9		o			o	1 to 10	Asphalt and timber			60	80	new set 06.09.12
Private crossing		37.2		o			o	11 to 23	Asphalt and timber			60	80	
Pepper Crk. Bridge	037.43-1DGO-29	37.43										60	80	
Private crossing Walls		37.8		o			o	n/a				60	80	
Hickory St Rd 405	516317V	38.2	o		o			24 to 37	Asphalt and timber			60	80	
Daisey Rd	516318C	38.5	o		o			38 to 56	Asphalt and rubber			60	70	
Frankford Ave. CR 401	516319J	38.6	o		o			57 to 78	Asphalt	o n/b	15	60	65	
Green St		38.7	o				o	79 to 90	Asphalt and rubber			60	60	
Mill St		38.8	o				o	91 to 100	Asphalt and rubber			60	80	
Delaware Ave	516321K	38.95	o		o			101 to 113	Asphalt			60	80	cantilever
Bridge	Br.No.15.49	IR 39.49										60	60	

SEGMENT 5 **FRANKFORD TO BERLIN**

Location/ name	AARDOT No.	Milepost	Public Crossing	Private Crossing	Protection Devices			Picture	Type of surface grade crossing	with sidewalk	Speed R	Speed at crossing		Comments
					w/Signals	w/Barriers	no protect.					Max V60mph	Max V80mph	
Lazy Lagoon Rd 380		MDDE 39.6	o		o			114 to 124	Asphalt and rubber			60	70	
Priv. crossing Feather Ln		40.1		o			o	125 to 133	Ballast			60	80	
Mc Cabe Rd		41.21	o		o			134 to 145	Asphalt and rubber			60	80	
Bridge	Br.No.17.84	41.85										60	80	
Cemetery Rd 54		42.2	o		o			146 to 160	Asphalt and rubber	o n/b		60	80	cantilever
Priv. cross.North Bay		42.3		o			o	161 to 172	Asphalt			60	80	closed
Parking access		42.58		o			o	179 to 182	Asphalt and rubber	o n/b		60	80	no protected
Hosier St		42.6	o		o		173 to 178	and 183 to 189	Asphalt and rubber	o n/b		60	80	
Church St		42.75	o		o			190 to 212	Asphalt and rubber	o n/b		60	80	
Hotel Rd	532038R	43.24	o		o			213 to 230	Asphalt and rubber			60	80	
Bridge	Br.No.19.40	43.33										60	80	
Hammond Rd 610		43.86	o		o			231 to 243	Asphalt and rubber			60	80	
Worcester Hwy Rd 113	531883T	44.27	o		o			244 to 272	Concrete panels			60	80	cantilever
Bishopville Rd	531882L	44.8	o		o			273 to 287	Asphalt and rubber			60	80	
Private crossing		45.3		o			o	n/a				60	80	
Bridge	Br.No.22.10	46.1										60	80	
Peerless Rd	531881E	46.37	o		o			288 to 298	Asphalt and rubber			60	80	
Bridge	Br.No.22.63	46.63										60	80	

Pitts Rd	531880X	46.88	o		o			299 to 310	Asphalt and rubber			60	80	cantilever
Cross walk		46.96		o			o	n/a				60	80	
Private crossing		47.14		o			o	n/a				60	80	
Bridge	Br.No.23.86	47.9										60	80	
Overhead Bridge Rd.90	Br.OH.No.24.32											60	80	
Carey Rd		48.77	o				o	311 to 319	Asphalt and timber			60	80	
Dear Park Dr		49.92	o				o	320 to 329	Asphalt and rubber			60	80	
Main St RD 818	Route 818	50.33	o		o			330 to 341	Asphalt and rubber			60	80	
Ramp to WB O.G-way	Route 50	50.65	o		o			342 to 352	Concrete panels			60	80	
Ocean Gateway WB		50.7	o		o			353 to 363	Concrete panels			60	80	cantilever
Ocean Gateway EB		50.72	o		o			364 to 373	Concrete panels			60	70	cantilever
Ramp off EB O.G-way		50.77	o		o			374 to 383	Concrete panels			60	60	
Old Ocean Blvd	531870S	51.36	o		o			384 to 395	Asphalt and rubber			30	30	
Main St/Cedar St.	531296X	51.62	o		o			396 to 413	Asphalt and rubber	o n/b		10	10	cantilever
Cross to parking		51.7	o				o	414 to 420	Ballast			n/a	n/a	
Cross to parking Baker St.		51.86	o				o	421 to 430	Asphalt and rubber			n/a	n/a	
Liberty /Broad St	531865V	MDDE 51.93	o		o			431 to 442	Asphalt and rubber	o n/b		n/a	n/a	cantilever

SEGMENT 6 **GEORGERTOWN TO LEWES, DE**

NO INFORMATION

Location/ name	AARDOT No.	Milepost	Public Crossing	Private Crossing	Protection Devices			Picture	Type of surface grade crossing					Comments
					w/Signals	w/Barriers	no protect.							
S King St crossing		DE 0.15	o				o							
Airport Rd		1.06	o		o									
US 9 Track		2.24	o		o									
Steiner Rd		2.83	o				o							
Rd 30		3.9	o		o									cantilever
Main St Rd 23		5.67	o		o									
Breakwater Acrec Ln		6.76	o				o							
Rd 267		7.15	o		o									
Lewes Georgetown Hwy		7.78	o		o									cantilever
Joseph Rd		8.38	o		o									
Rd 247		8.62	o		o									
Farm crossing		9.15		o			o							
Sweet Briar Rd		9.28	o		o									
ST Rd 265		10.21	o		o									
Nassau Rd		11.36	o		o									
Old Orchard Rd		12.27	o		o									
Ritter Ln		12.84	o				o							
County Rd		13.39	o		o									
Savanah Rd		13.48	o		o									cantilever
Rd 268		13.94	o				o							
Jeferson Ave		14.27	o				o							
Private crossing (Franklin)		14.46		o			o							
Gilles Neck Rd		DE 14.63	o				o							

SEGMENT 7 **BERLIN TO OCEAN CITY PROPOSED TRACK**

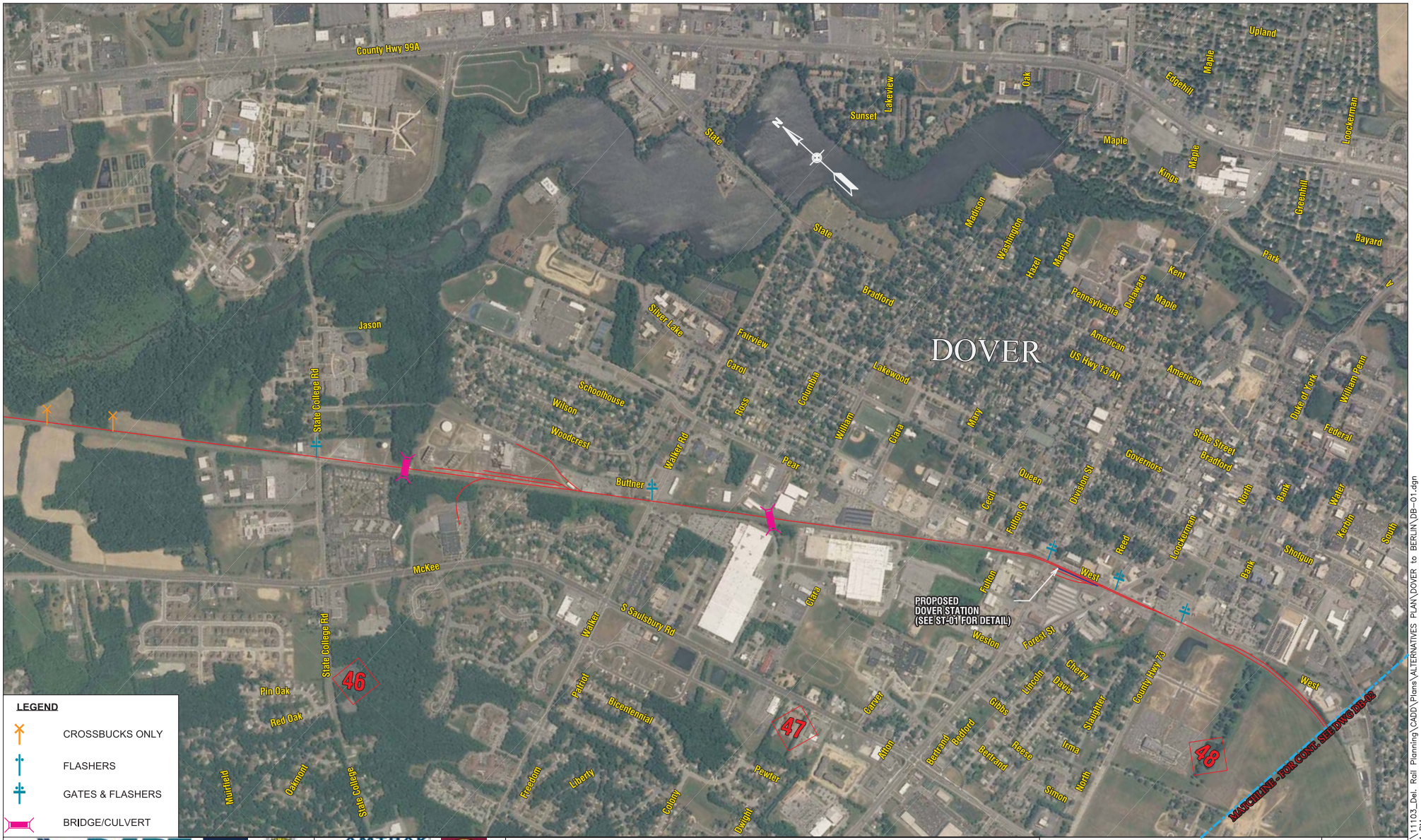
D R A F T

Location/ name	AARDOT No.	Milepost	Public Crossing	Private Crossing	Protection Devices			Picture	Type of surface grade crossing					
					w/Signals	w/Barriers	no protect.							

Berlin Station		DE 0.15												
Cedar St.		DE.000	o		o	o								
Main St		0.12	o		o	o								
Williams Ave Rd 377		0.33	o		o	o								
Worcester Hwy 113		0.66	o		o	o								
Franklin Ave		0.4	o		o	o								
Flower St.		0.63	o		o	o								
Bridge Culvert	Proposed	0.9												
Private crossing		1.2		o			o							
Seahawk Rd.		1.46	o		o	o								
Mary Rd.		1.95	o		o	o								
Culvert		2.45												
Holly/Grove Rd.		3.34	o		o	o								
New Bridge -Proposed	Proposed	4.48												
Road (no name) cross.		4.57	o		o	o								
Private crossing		5.29		o			o							
New station														
Stephen Decatur Rd.		5.36	o		o	o								

Appendix III

Dover to Berlin Plan Set


DOVER
County Hwy 99A
State
Sunset
Lakeview
Oak
Upland
Maple
Edgehill
Loockerman
Kings
Greenhill
Bayard
Park
Madison
Washington
Hazel
Maryland
Kent
Pennsylvania
Delaware
Bradford
Silver Lake
Fairview
Carol
Columbia
Lakewood
Jason
Schoolhouse
Wilson
Wooderest
Ross
William
Clara
Mary
American
US Hwy 13 Alt
Duke of York
William Penn
Federal
State Street
Governors
Queen
Division St
Cecil
Fulton St
Buttner
Walker Rd
Pear
State College Rd
McKee
Reed
Loockerman
North
Bank
Water
Kerbin
South
Shotgun
West
Fulton
Glara
Walker
S Saulsbury Rd
Weston
Forest St
Cherry
Lincoln
Davis
Gibbs
Slaughter
County Hwy 73
Carver
Patriot
Bicentennial
Pin Oak
Red Oak
Muirfield
Oakmont
State College
Freedom
Liberty
Colony
Dwight
Fewler
Allen
Bertrand
Bedford
Reese
Irma
Simon
North
PROPOSED
DOVER STATION
(SEE ST-01 FOR DETAIL)
MATCHLINE - FOR CONT. SEE DWG DB-02
46
47
48
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO. DB-1
SHEET NO.
\\rkkm\V2011\2011\11103_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-01.dgn
08/14/2012, 4:21:14 PM


US-13 S DUPONT HWY
S Governors Ave
Lynnhaven
Joshua Clayton
Nathaniel Mitchell
Daniel Rodney
Charles Polk
Richard Bassett
Posy
John Clark
Fiddlers
Wintetberry
Peabody
Kessaining
Mockingbird
Bradford
Waples
Monroe
Wyoming
Dover
Westview
Konschak
Oak
Yearsley
Baker
Blue Beach
Alger
Turner
County Hwy 192
Haman
West
MATCHLINE - FOR CONT. SEE DWG DB-02
County Hwy 190
Carter
Chapel
Old North
Commons
West
Willow
South
Caesar Rodney
Meadow
Camden Wyoming
Front
Miller
Barley
Church
Third
Laylon
Railroad
Pine
County Hwy 52
MATCHLINE - FOR CONT. SEE DWG DB-03
Third
Broad
Grant
Mechanic
Wyoming Mill
49
50
Simon
Hazlettville
Enterprise
Commerce
Electric
Wyoming Mill
Papen
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO. DB-2
SHEET NO.
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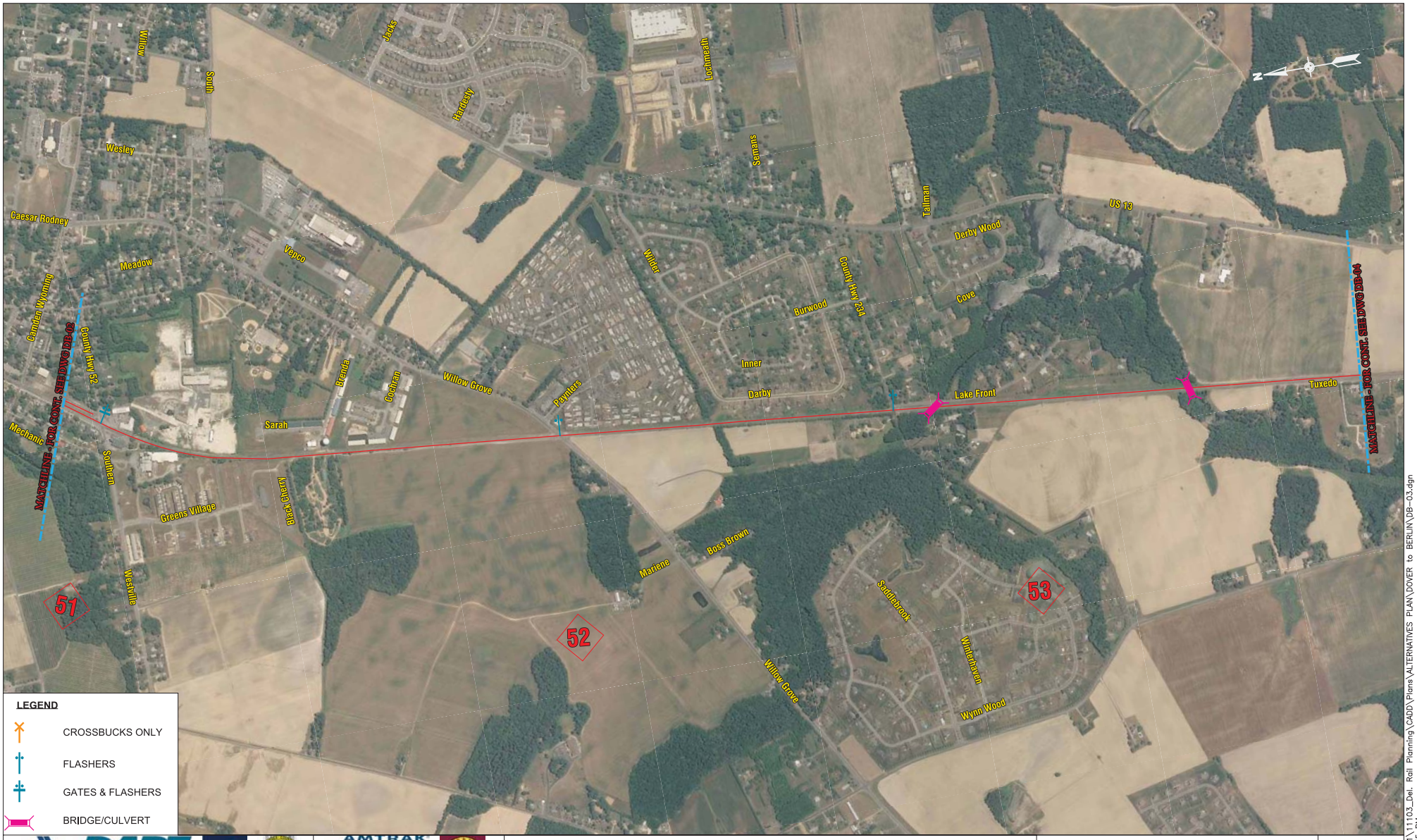

DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-3

SHEET NO. ____ ____

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LEGEND

- CROSSBUCKS ONLY
- FLASHERS
- GATES & FLASHERS
- BRIDGE/CULVERT

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500 0 500 1000

DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-4

SHEET NO.

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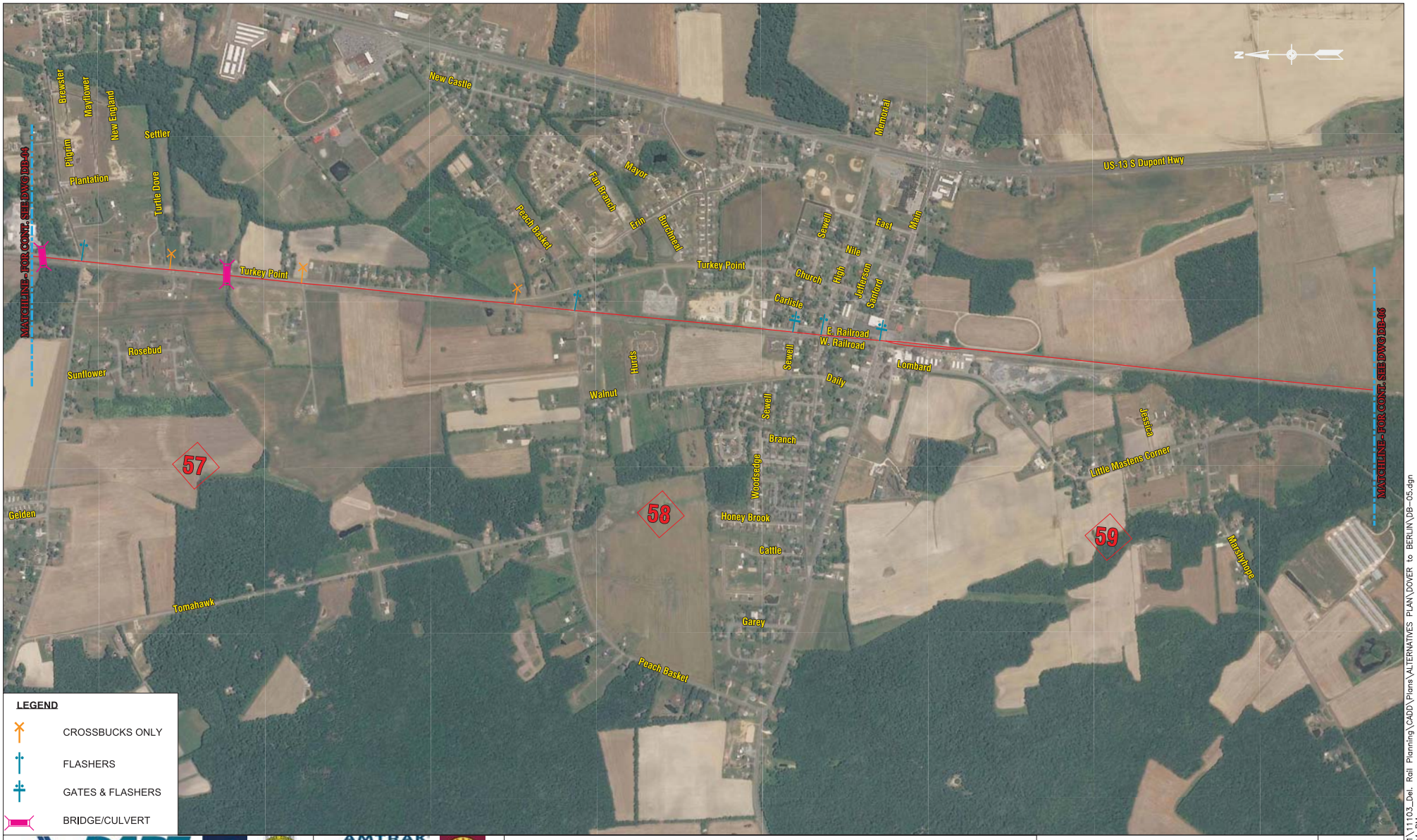

DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-5

SHEET NO.

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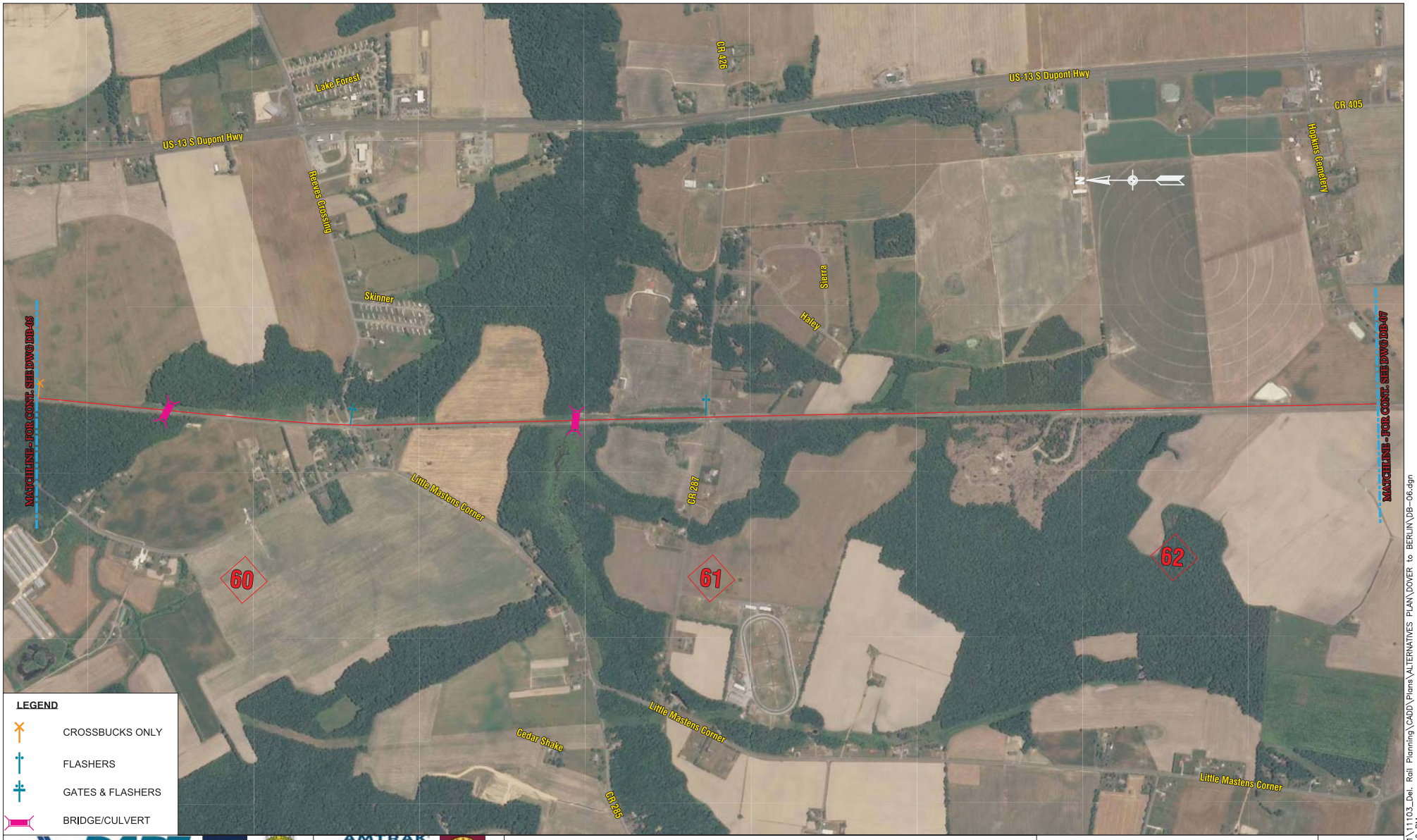

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DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-6

SHEET NO.

\\rkkm\V2011\2011\11103_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-06.dgn
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MATCHLINE - FOR CONT. SEE DWG DB-08
MATCHLINE - FOR CONT. SEE DWG DB-06
US Hwy 13
New
Raughley Hill
CR 405
US Hwy 13 NB
US Hwy 13 SB
Porter
Messicks
CR 433
Rose Haven
Gluckey
Smith
Center
Gordon
Dixon
Mill
Simpson
US-13 S Dupont Hwy
Messick
Dickerson
Peck
Harrington
Thomas
Reed
Delaware
Simmons
Liberty
Second
Harrington
Center
Third
Mill
Ward
East
Fairgrounds
John Holloway
Railroad
Pea Hill
Weiner
Fleming
Commerce
Franklin
Hanley
Calvin
Dorman
Short
Reese
Fairground
CR 314
North
South
Liberty
Grant
Wolcott
Mechanic
High
West
Madison
Mispillion
Milby
Walt Messick Rd
Hopkins Cemetery
Little Mastens Corner
West
63
64
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
A Division of DelDOT
Getting There Starts Here
Dover/Kent County MPO
Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NS
NORFOLK SOUTHERN
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO.
DB-7
SHEET NO.
\\rkkm\V2011\2011\11103_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-07.dgn
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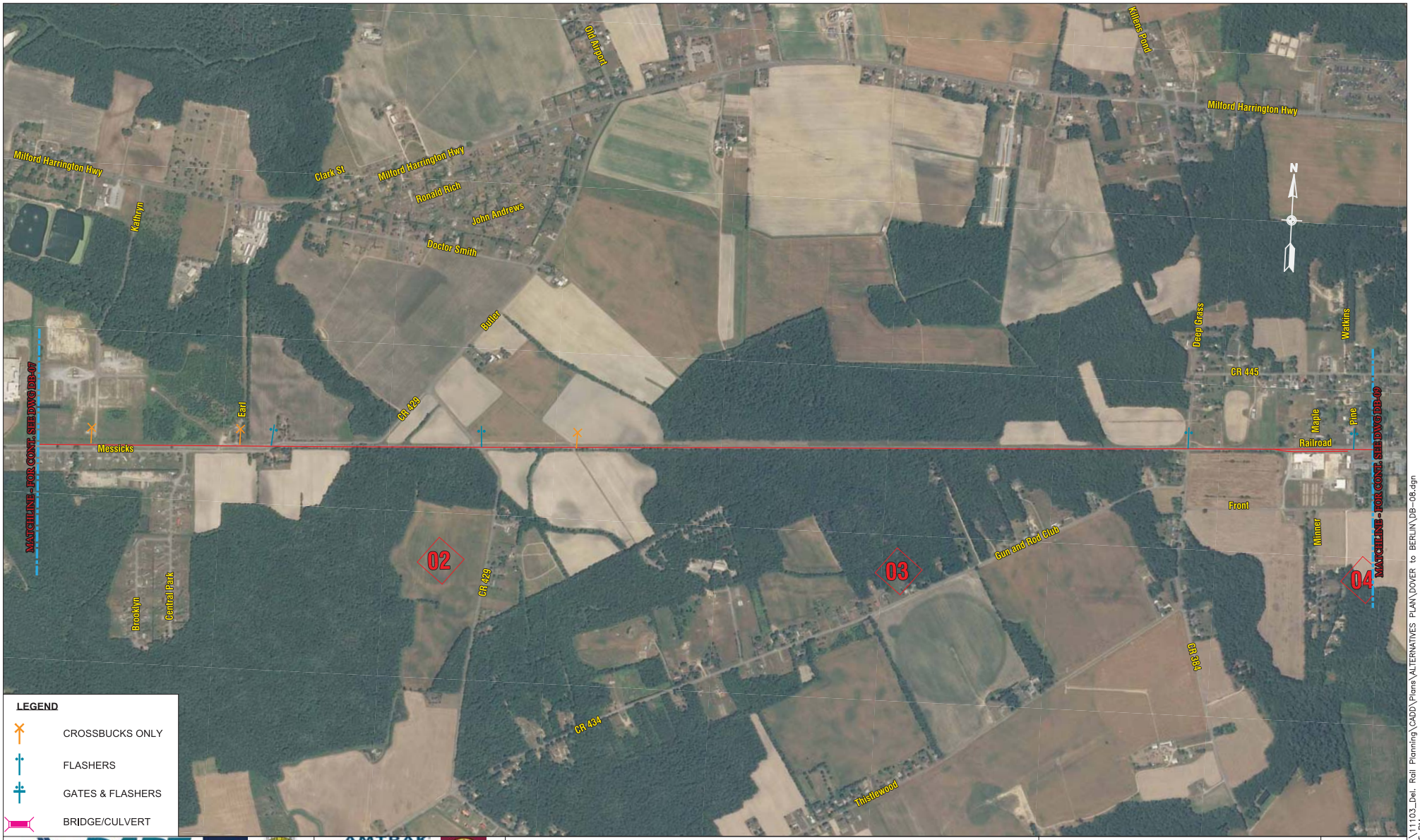
Milford Harrington Hwy
Clark St
Milford Harrington Hwy
Old Airport
Killens Pond
Milford Harrington Hwy
Kathryn
Ronald Rich
John Andrews
Doctor Smith
Butler
Deep Grass
Watkins
CR 445
MATCHLINE - FOR CONT. SEE DWG DB-07
Earl
CR 428
Messicks
Railroad
Maple
Pine
MATCHLINE - FOR CONT. SEE DWG DB-09
Front
Miner
Gun and Rod Club
02
03
04
CR 429
Brooklyn
Central Park
CR 384
CR 434
Thistlewood
N
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO. DB-8
SHEET NO.
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Foal
CR 395
Doe
Milford Harrington Hwy
Blairs Pond
Canterbury
Broad
Sunset
School
CR 445
CR 447
Holly Hill
Railroad
Mill
Pine
Richardson
Wharton
Armour
Front
MAINLINE - FOR CONT. SEE DWG DB-08
MAINLINE - FOR CONT. SEE DWG DB-10
05
06
Wisteria
Ivy
Grapevine
Lindenham
Blairs Pond Rd
Williamsville
Gooseberry
Haven
Lake Crest
Griffiths Lake
The Mead
N
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO. DB-9
SHEET NO.
\\rkkm\V2011\2011\11103_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-09.dgn
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MILFORD
N. Walnut
Washington
2nd
Columbia
5th
Montgomery
Park
Pearl
3rd
Ball Park
Gilcrest
Clarke
Abbott
Hammond
Adams
Evans
CR 225
Bright
Allen
Lucia
North
6th
5th
4th
3rd
West
Church
Truitt
Rogers
Mill
Maple
Jefferson
S. Walnut
Plum
Dixie
Loland
Swains Private
Credit Union
US 113 Dupont Blvd
S. Dupont US 113
N. Front
Lakeview
Kings
Sussex
Clarke
Delaware
Nelson
Elizabeth
McCoy
Pennsylvania
Oak
Wilbur
County Road 56A
School
Pine
Wintien
08
09
10
Kings
Marvel
Caulk
Reed
Lakelawn
Kent
Hall
Elm
New
Seabury
Woodland
Cherry
East
Milford Harrington Hwy
West
Shore
Evergreen
Shawnee
Donovan
Woodside
Betty
Dot
Williamsville
Veterans
Sunrise
Wiseman
Meadow Brook
Pine Tree
Bontrager
Webb
Lake Crest
MATCHLINE - FOR CONT. SEE DWG DB-09
MATCHLINE - FOR CONT. SEE DWG DB-11
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
A Division of DelDOT
Getting There Starts Here
Dover/Kent County MPO
Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NS
NORFOLK SOUTHERN
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO.
DB-10
SHEET NO.
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INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-11

SHEET NO. ____ ____

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MATCHLINE - FOR CONT. SEE DWG DB-11
MATCHLINE - FOR CONT. SEE DWG DB-13
CR 226
CR 232
Cemetery
Metz
Main St
Ponder
Oak
Pine
King
Shorts
Prettyman
E. Railroad
W. Railroad
McCaulley
Read
Washington
Ellegood
State
Old State
Warner
County Hwy 213
Pin Oak
Wild Cherry
County Hwy 641
Beach Hwy
Priveway
Spellman
Fleatown
Windmill
Hudson Pond
Dove
Hickory
Curtdogg
US 113 Dupont Hwy
14
15
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
A Division of DelDOT
Getting There Starts Here
Dover/Kent County MPO
Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NORFOLK SOUTHERN
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO.
DB-12
SHEET NO.
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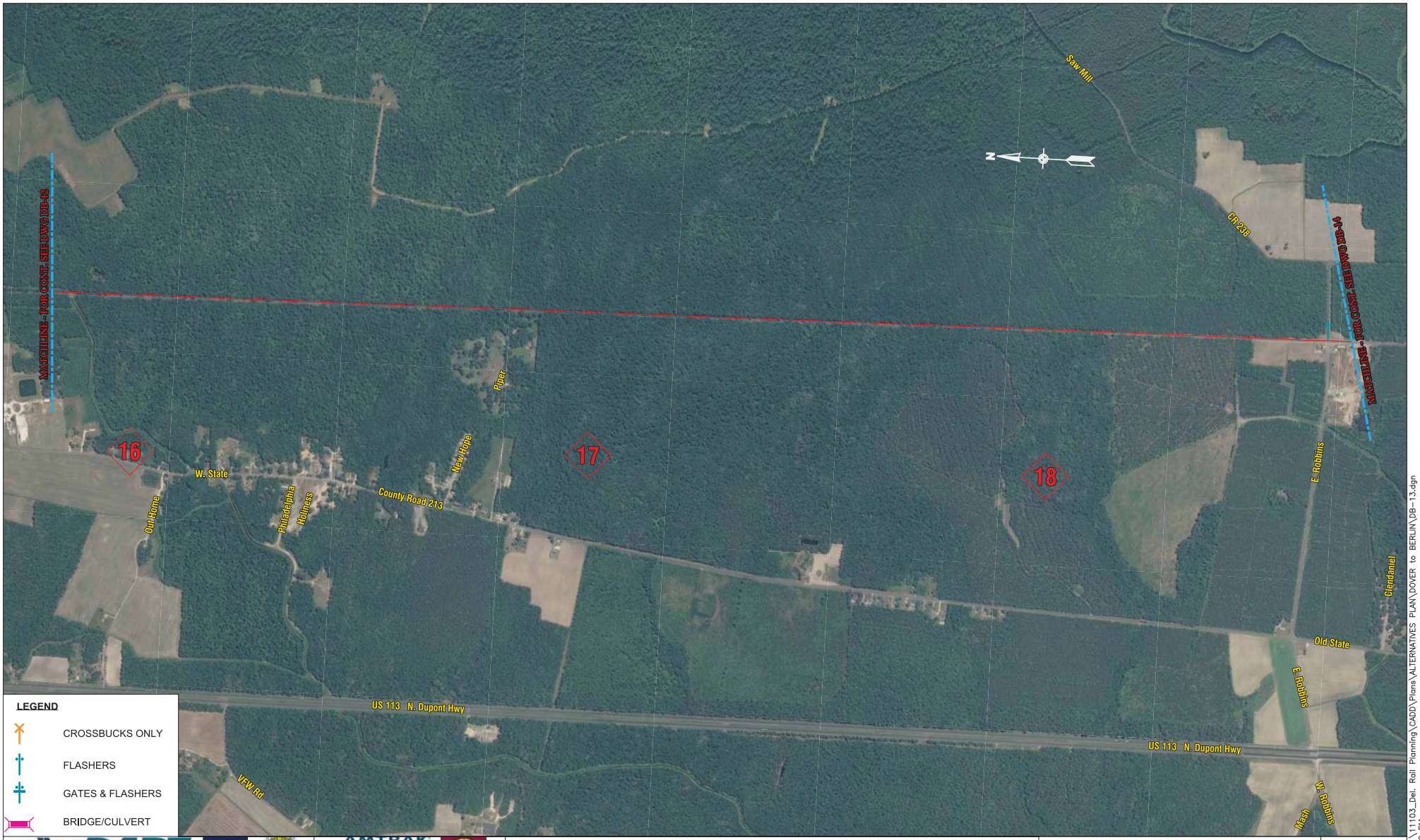
MATCHLINE - FOR CONT. SEE DWG DB-12
MATCHLINE - FOR CONT. SEE DWG DB-14
16
17
18
W. State
Out Home
Philadelphia
Holness
New Hope
County Road 213
Piper
Saw Mill
CR 238
E. Robbins
Clendaniel
Old State
US 113 N. Dupont Hwy
VFW Rd
W. Robbins
Nash
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
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CONTRACT NO.
DRAWING NO. DB-13
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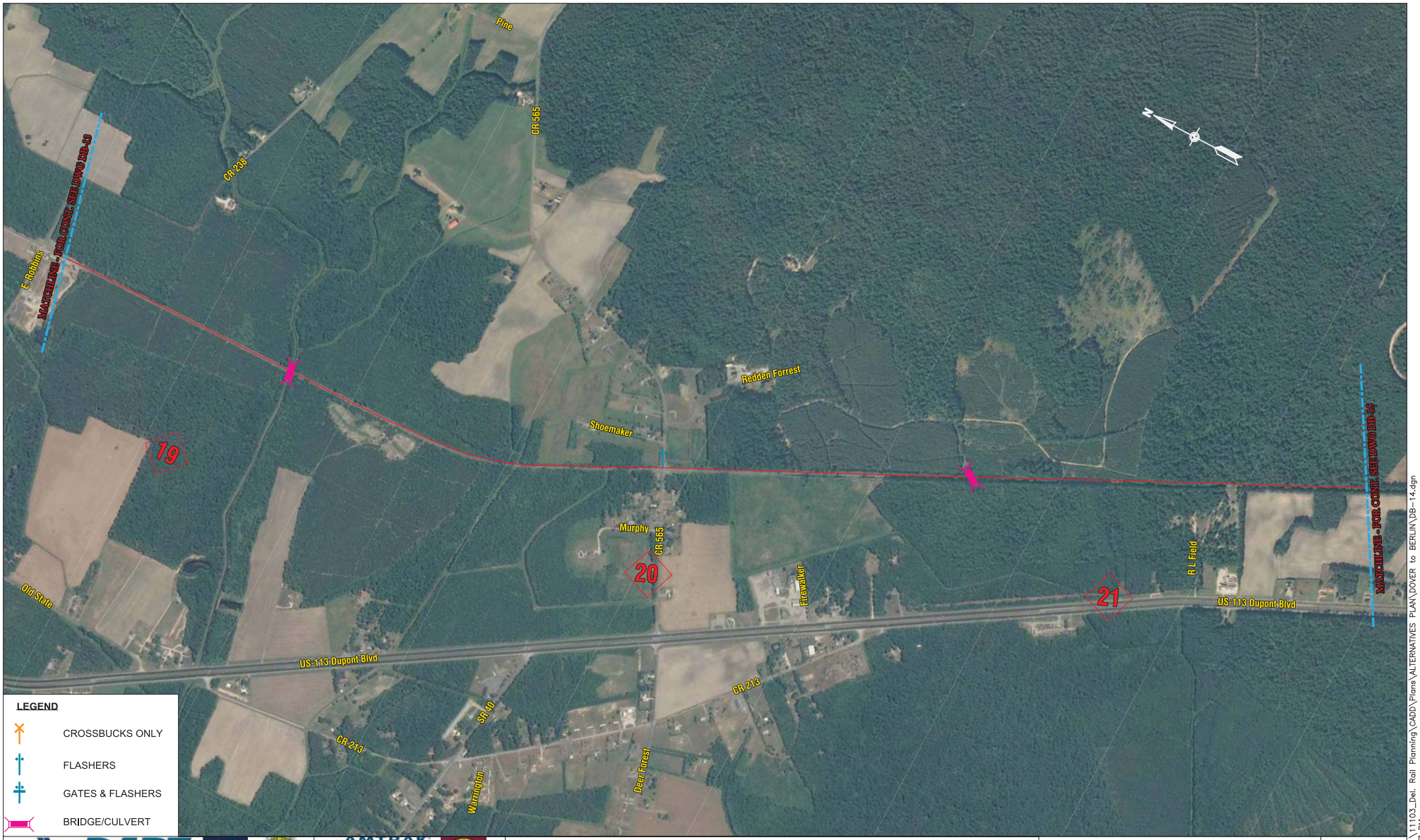

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AMTRAK · NORFOLK SOUTHERN

500 0 500 1000

DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-14

SHEET NO. ____ ____

\\rkkm\V2011\2011\11103_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-14.dgn
08/14/2012, 2:37:47 PM


GEORGETOWN
PROPOSED
GEORGETOWN STATION
(SEE ST-02 FOR DETAIL)
MATCHLINE - FOR CONT. SEE DWG DB-14
MATCHLINE - FOR CONT. SEE DWG DB-16
US-113 Dupont Blvd
CR-244
CR-285
Huckleberry
Downs
Donovans
Wilson
Ebony
Teak
Ivory
Maple
Oak
Savannah
Treatment Plant
Sandhill
Airport
Laurel Street
US 9 Lewes Georgetown Hwy
Burton
Parsons
Waples
Barr
Albury
Calhoun
Cedar
Rose
Cooper
Laurel
King
Strawberry
Pine
Chestnut
Indiantown
Carver
Booker
Beale
Stevenson
North
Kimmey
Green
Railroad
Layton
Front
Cherry
Town
Hearts
Depot
Race
Pepper
Douglas
New
Bedford
James
Love
Mary
Swain
Elizabeth
South
Adams
Old Laurel
Wagamon
Margaret
Harvest
Bayberry
Lynchs
Stephens
West
Express
Pine Tree
Randys
Professional Park
Surrey
Cartridge
Bedford
Cordy
Mae
Goff
Gravelly Branch
Mission
Charity
College Park
Berlin
Dunbarton
Edward
Robinson
Carolyn
Alfred
Brimhall
Peninsula
22
23
24
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
A Division of DelDOT
Getting There Starts Here
Dover/Kent County MPO
Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NORFOLK SOUTHERN
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
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DB-15
SHEET NO.
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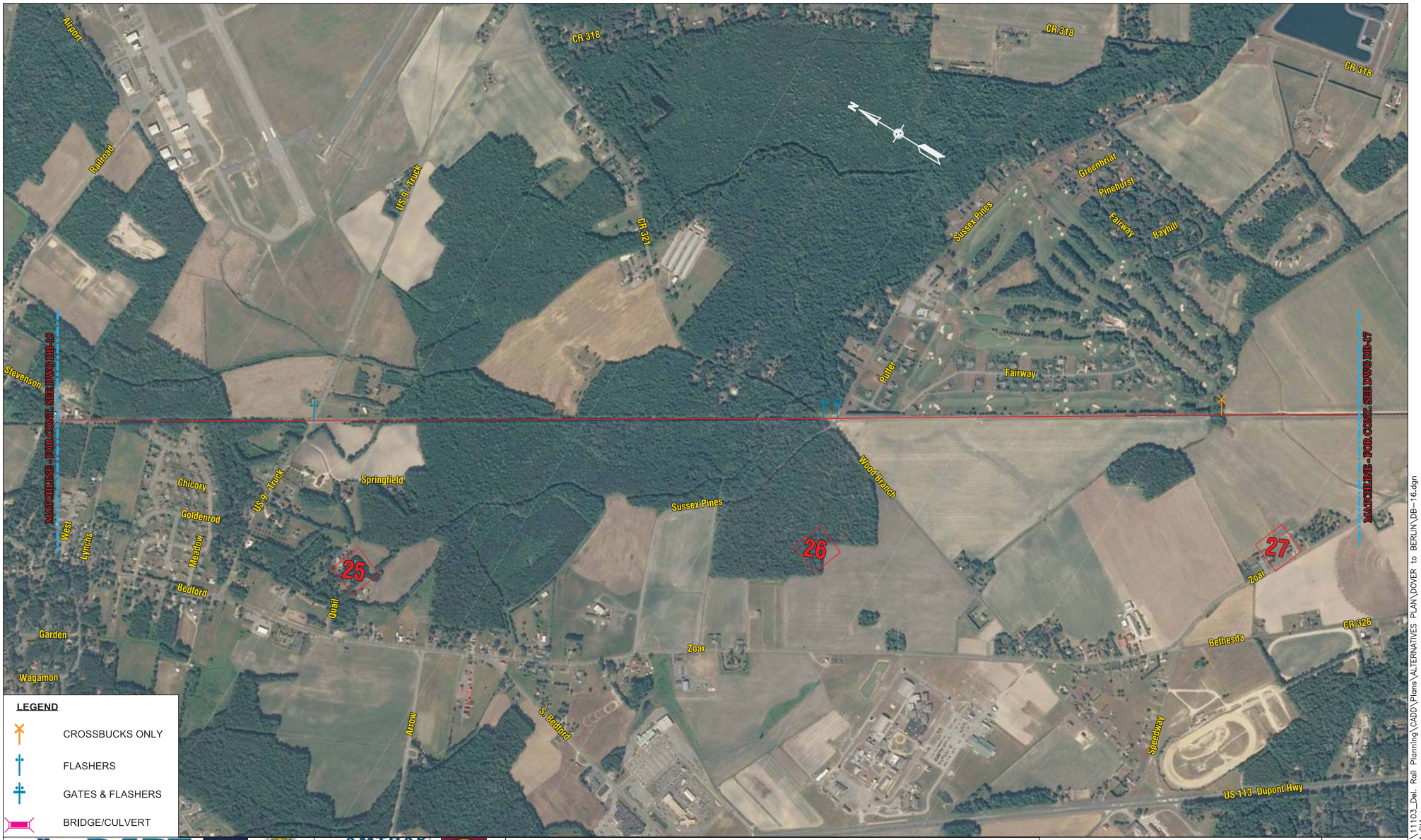
Airport
Railroad
CR 318
US 9 - Truck
CR 321
Greenbriar
Pinehurst
Fairway
Bayhill
Sussex Pines
Putter
Fairway
Stevenson
MATCHLINE - FOR CONT. SEE DWG DB-15
MATCHLINE - FOR CONT. SEE DWG DB-17
Chicory
Springfield
Goldenrod
Sussex Pines
Wood Branch
West
Lynchs
Meadow
Bedford
Quail
25
26
27
Zoar
Garden
Wagamon
Bethesda
CR 326
Arrow
S. Bedford
Speedway
US 113 Dupont Hwy
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
A Division of DelDOT
Getting There Starts Here
Dover/Kent County MPO
Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NORFOLK SOUTHERN
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO.
DB-16
SHEET NO.
\\rkenv\V2011\2011\11163_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-16.dgn
08/14/2012, 3:12:54 PM


Enterprise
Cedar
Marcella
Leah
CR 317
CR 318
Colony
Governor Stockley
SR 48
Boyd
Sussex
Waples
Tatumanz
Lloyd
CR 318
Patriots
MAINLINE - FOR CONT. SEE DWG DB-16
Zoar
Governor Stockley
Avenue of Honor
Cropers
Forest
Teacher
Straight Arrow
MAINLINE - FOR CONT. SEE DWG DB-18
Bethesda
CR 326
Bethesda
28
29
30
Manor
Rich
Cow Bridge
US-113 Dupont Blvd
Peppersdtone
US-113 Dupont Blvd
CR 329
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO. DB-17
SHEET NO.
\\rkkny\V2011\2011\11103_Del. Rail Planning\CADD\Plans\ALTERNATIVES PLAN\DOVER to BERLIN\DB-17.dgn
08/14/2012, 3:18:11 PM


MILLSBORO
SR 30
Tarumawr
Straight Arrow
Patriots
CR 318
Meadow
Woodland
Bethesda
Doe Bridge
CR 326
MATCHLINE - FOR CONT. SEE DWG DB-17
Fox Run
Bark Pond
31
CR 328
US 113 Dupont Hwy
Betts Pond
Lakeside
Pine Lodge
Millers Run
Milestone
Pine
Oak
Route 82
Monroe
Northern
32
US 113 Dupont Hwy
Edge
Kerlyn
Oak
Mystic
Millrace
West
Sandstone
Wharton
Delaware
Kendall
MD 24-Millsboro Hwy
MD 20
Route 339
Irons
Wilson
Boulevard
Mitchell
Gorwin
SR 82A
Wells
Washington
Main
Morris
Church
Union
CR 339A
Railroad
State
Sussex
Ellis
Jones
Moore
Davis
Dodd
Cubalo
River
Jersey
Main
John J. Williams Hwy
Layton
Holly Oak
Justice
Pemrose
Carlisle
Wolf Carmean
CR 331
CR 339
MATCHLINE - FOR CONT. SEE DWG DB-19
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
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Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NORFOLK SOUTHERN
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DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
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DB-18
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LEGEND

- CROSSBUCKS ONLY
- FLASHERS
- GATES & FLASHERS
- BRIDGE/CULVERT

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AMTRAK · NS NORFOLK SOUTHERN

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DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

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INTERCITY RAIL STUDY

DOVER to BERLIN

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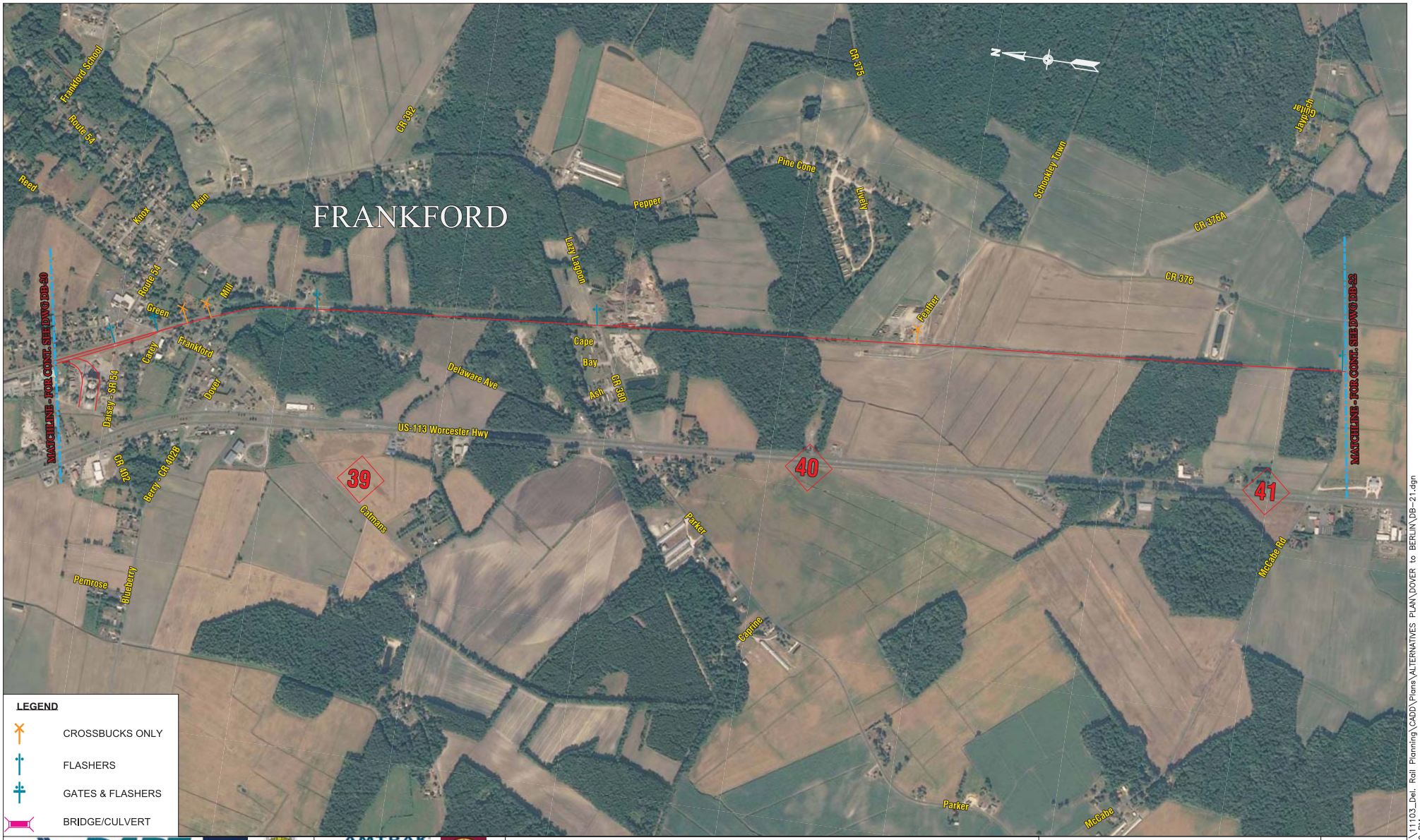

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DOVER to BERLIN

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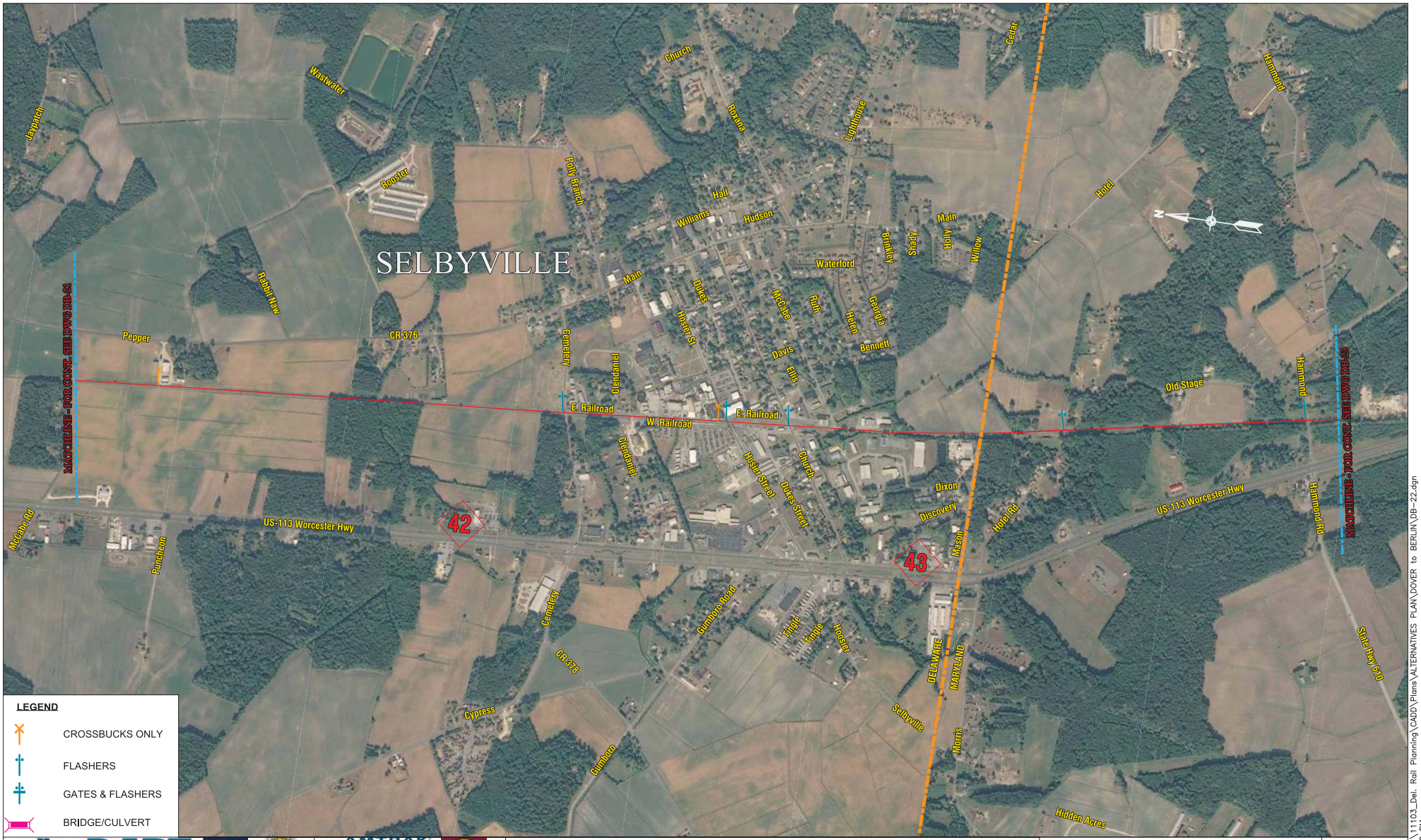
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Wastwater
Church
Roxana
Lighthouse
Cedar
Hammond
Jaybatch
Rooster
Polly Branch
Hall
Williams
Hudson
Hotel
Main
Brinkley
Shady
Holly
Willow
Waterford
Rabbit Nest
Main
Dukes
McCabe
Ruth
Georgia
Haven
Hoser St.
Davis
Ellis
Bennett
Pepper
CR 376
Cemetery
Glendaniel
E. Railroad
W. Railroad
E. Railroad
Old Stage
Hammond
MASON LINE - FOR CONT. SEE DWG DB-21
MASON LINE - FOR CONT. SEE DWG DB-23
Glendaniel
Hoser Street
Church
Dukes Street
Dixon
Discovery
Hotel Rd
US-113 Worcester Hwy
US-113 Worcester Hwy
Hammond Rd
McCabe Rd
Puncheon
42
43
Mason
Cemetery
Gumboro Road
Tingle
Tingle
Hoosier
CR 378
DELAWARE
MARYLAND
State Hwy 610
Cypress
Selbyville
Morris
Gumboro
Hidden Acres
N
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
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INTERCITY RAIL STUDY
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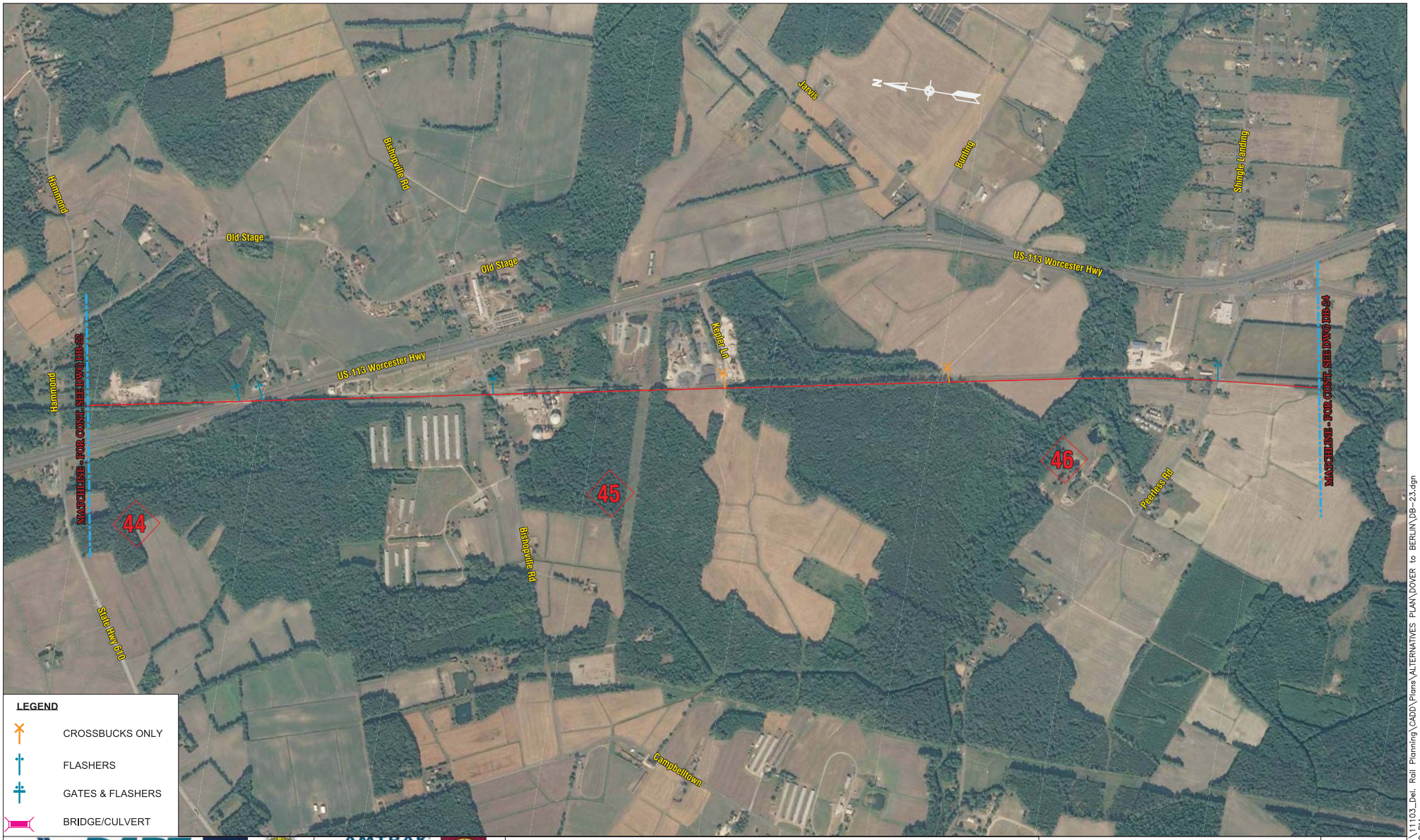
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Old Stage
Bishopville Rd
Jarvis
Bunting
Shingle Landing
US-113 Worcester Hwy
Kepler Ln
Peerless Rd
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MATCHLINE - FOR CONT. SEE DWG DB-24
44
45
46
State Hwy 610
Campbelltown
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
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INTERCITY RAIL STUDY
DOVER to BERLIN
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DELMARVA
INTERCITY RAIL STUDY

DOVER to BERLIN

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. DB-24

SHEET NO.

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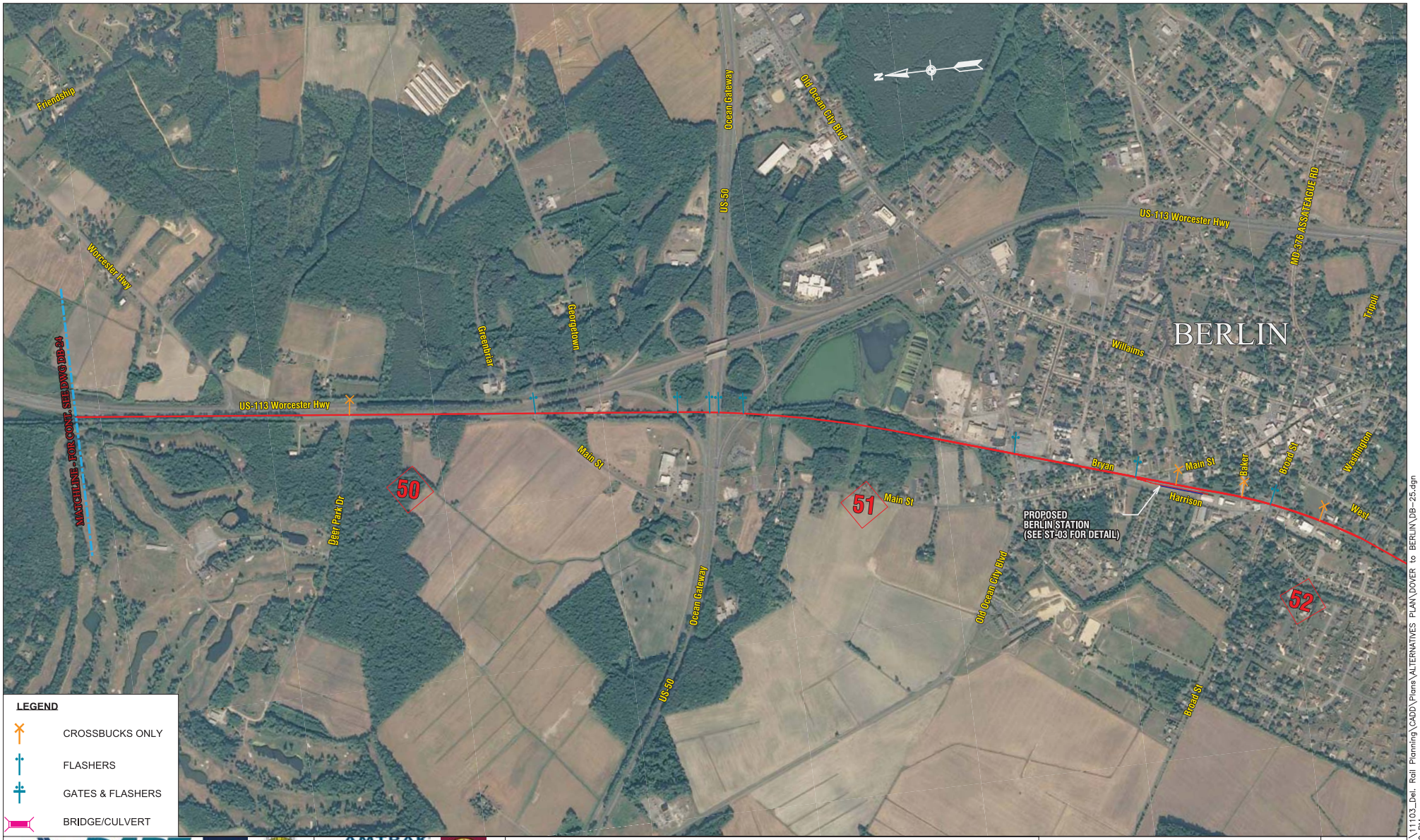
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Worcester Hwy
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Greenbriar
Georgetown
Ocean Gateway
US-50
Old Ocean City Blvd
US-113 Worcester Hwy
MD-376 ASSATEAGUE RD
Tripoli
BERLIN
Willaims
US-113 Worcester Hwy
Main St
50
Beer Park Dr
51
Main St
PROPOSED
BERLIN STATION
(SEE ST-03 FOR DETAIL)
Bryan
Main St
Harrison
Baker
Broad St
Washington
West
Old Ocean City Blvd
Ocean Gateway
US-50
52
Broad St
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
DOVER to BERLIN
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO.
DB-25
SHEET NO.
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Appendix IV

Berlin to West Ocean City Plan Set

DELMARVA
INTERCITY RAIL STUDY

BERLIN to WOC

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. B-WOC-1

SHEET NO. 1 3

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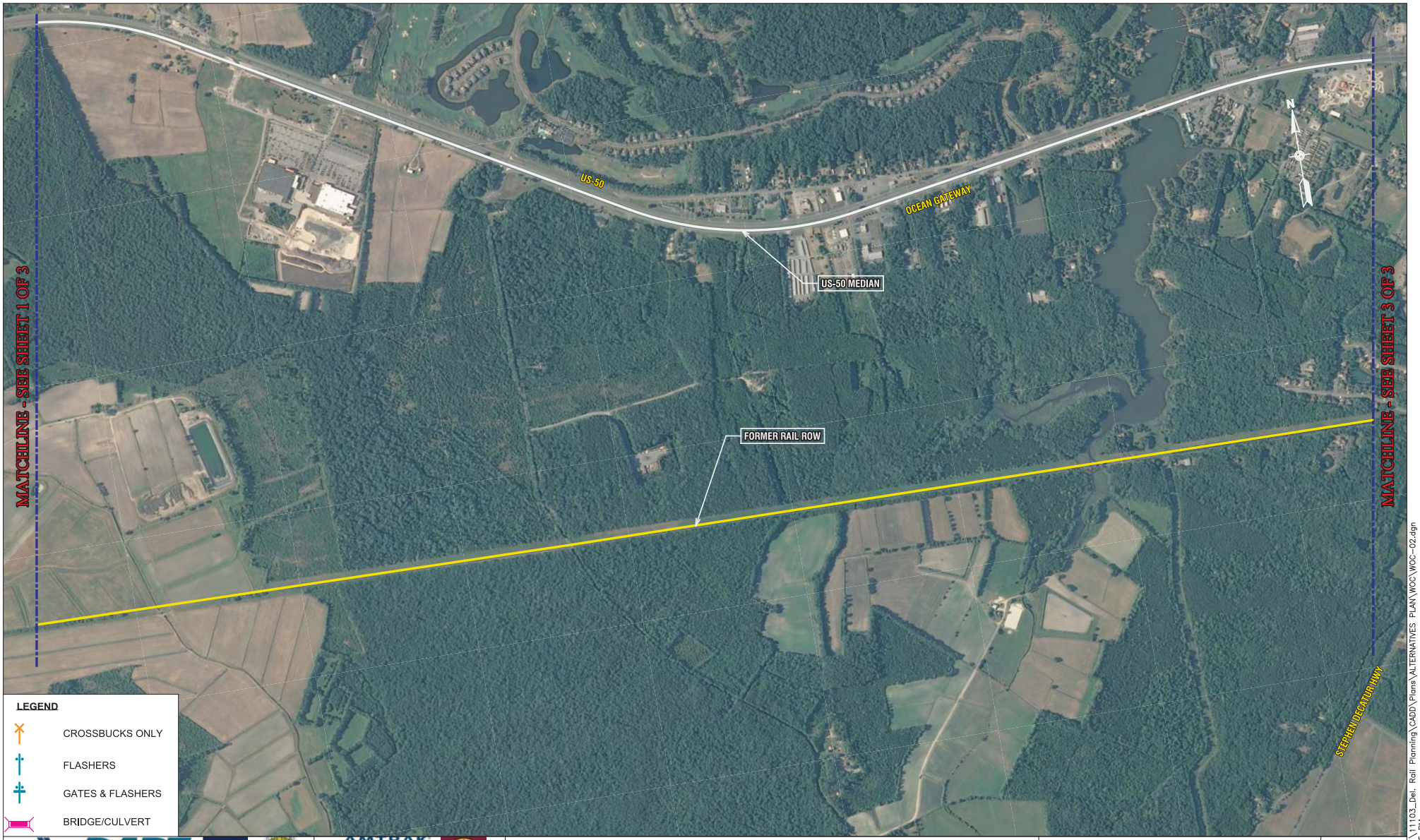
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MATCHLINE - SEE SHEET 3 OF 3
US-50
OCEAN GATEWAY
US-50 MEDIAN
FORMER RAIL ROW
STEPHEN DECATUR HWY
N
LEGEND
CROSSBUCKS ONLY
FLASHERS
GATES & FLASHERS
BRIDGE/CULVERT
DelDOT
DART
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Dover/Kent County MPO
Maryland Department of Transportation
SEPTA
WILMAPCO
Wilmington Area Planning Council
AMTRAK
NORFOLK SOUTHERN
500 0 500 1000
DELMARVA
INTERCITY RAIL STUDY
BERLIN to WOC
DATE: JULY 2012
SCALE: 1"=500'
CONTRACT NO.
DRAWING NO.
B-WOC-2
SHEET NO.
2 3
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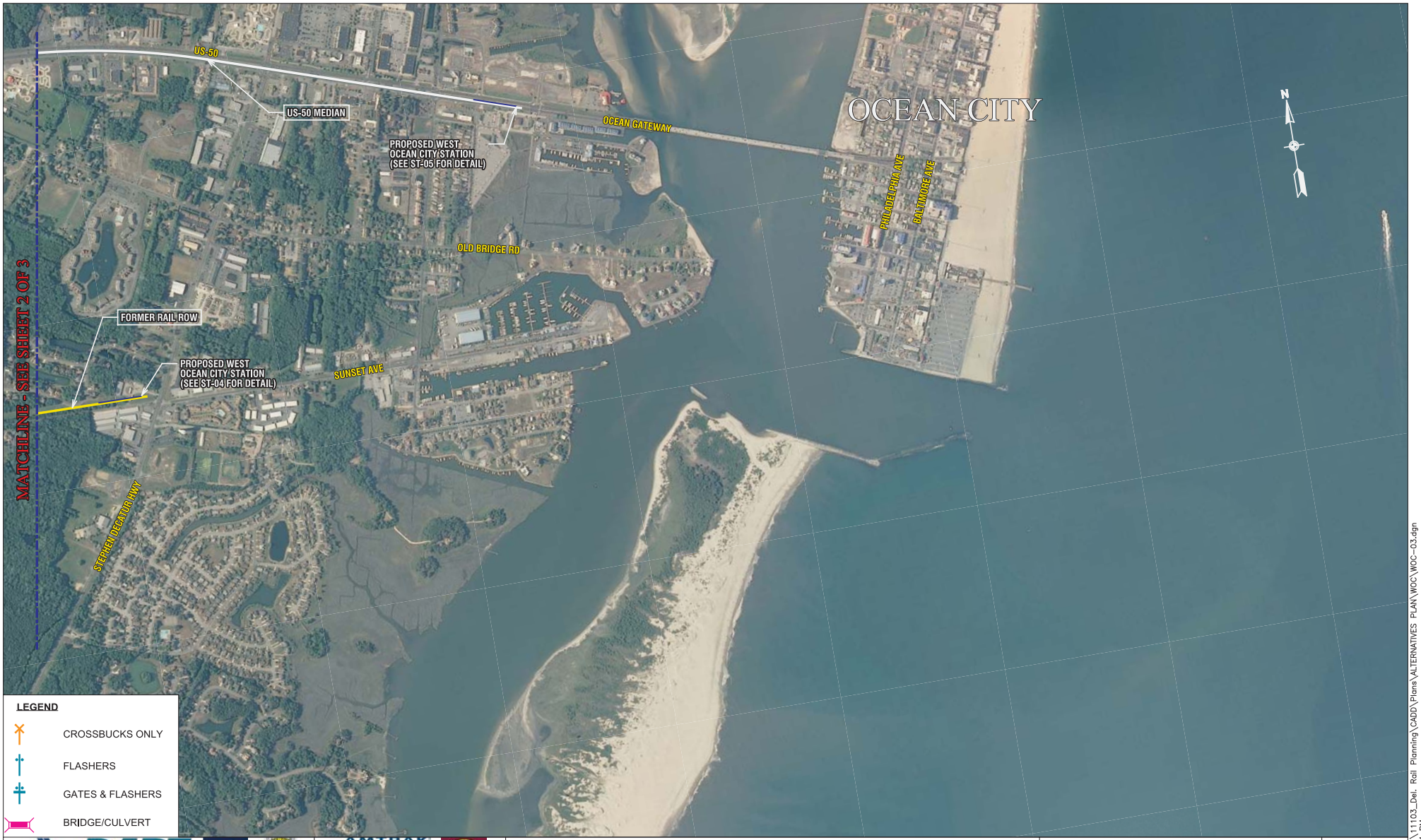

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AMTRAK | NORFOLK SOUTHERN

500 0 500 1000

DELMARVA
INTERCITY RAIL STUDY

BERLIN to WOC

DATE: JULY 2012 SCALE: 1"=500'

CONTRACT NO.

DRAWING NO. B-WOC-3

SHEET NO. 3 3

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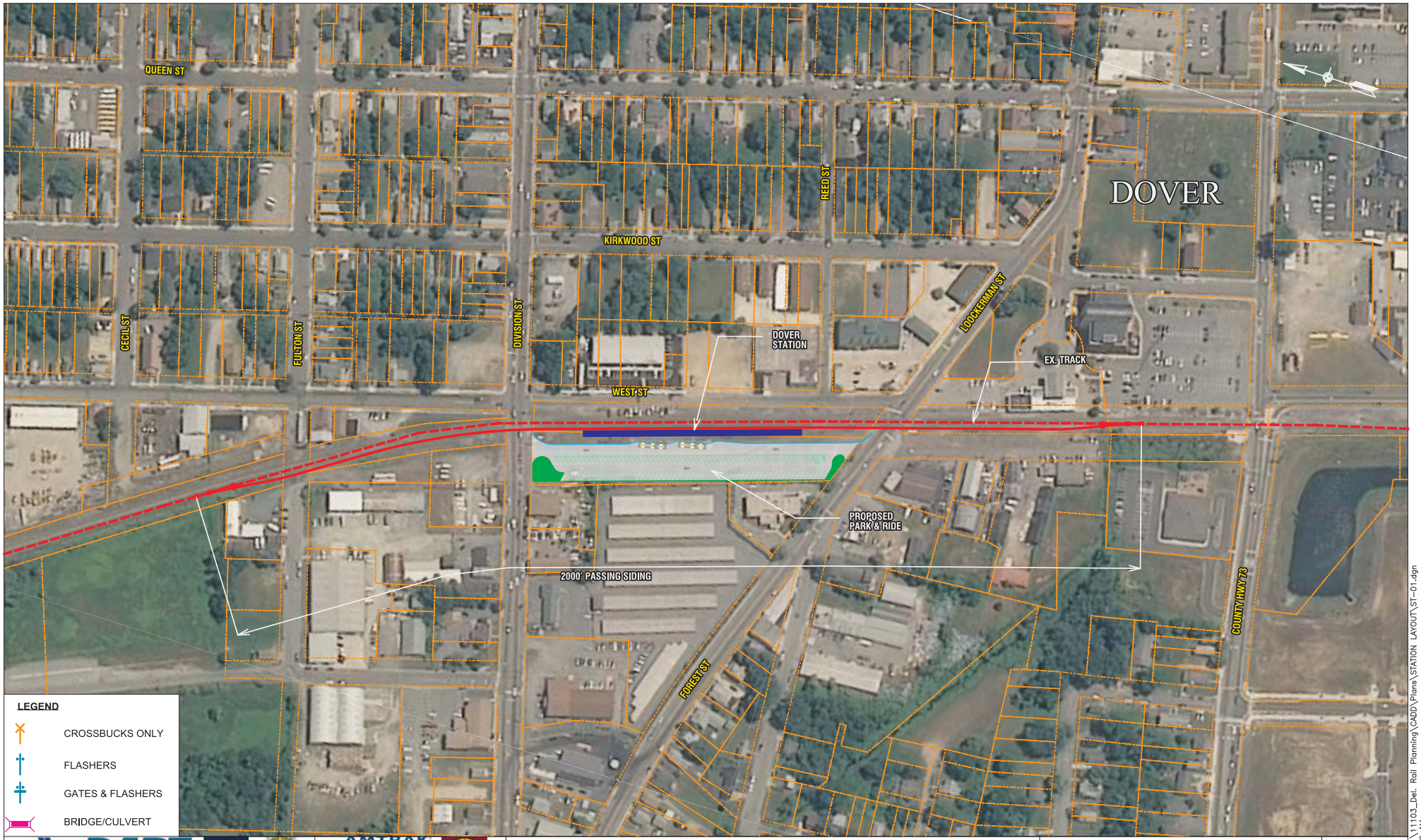
Appendix V

Station Layout Plan Set



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DELMARVA
INTERCITY RAIL STUDY

DOVER STATION

DATE: JULY 2012 SCALE: 1"=100'

CONTRACT NO.

DRAWING NO. ST-01

SHEET NO.

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AMTRAK | NORFOLK SOUTHERN

DELMARVA
INTERCITY RAIL STUDY

GEORGETOWN STATION

DATE: JULY 2012 SCALE: 1"=100'

CONTRACT NO.

DRAWING NO. ST-02

SHEET NO.

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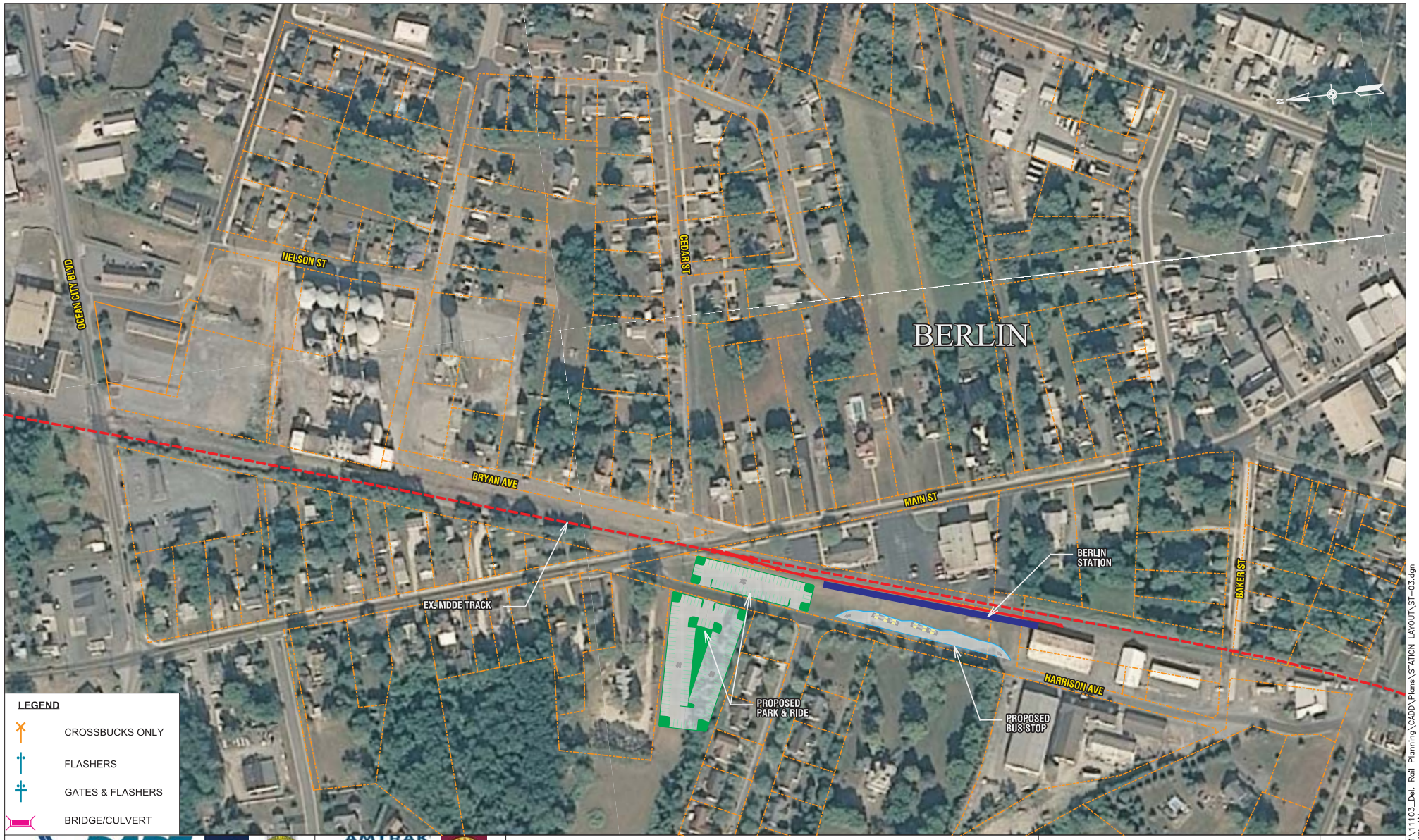

DelDOT | DART A Division of DelDOT Getting There Starts Here | Dover/Kent County MPO | Maryland Department of Transportation | SEPTA | WILMAPCO Wilmington Area Planning Council

AMTRAK | NS NORFOLK SOUTHERN

DELMARVA
INTERCITY RAIL STUDY

BERLIN STATION

DATE: JULY 2012 SCALE: 1"=100'

CONTRACT NO.

DRAWING NO. ST-03

SHEET NO.

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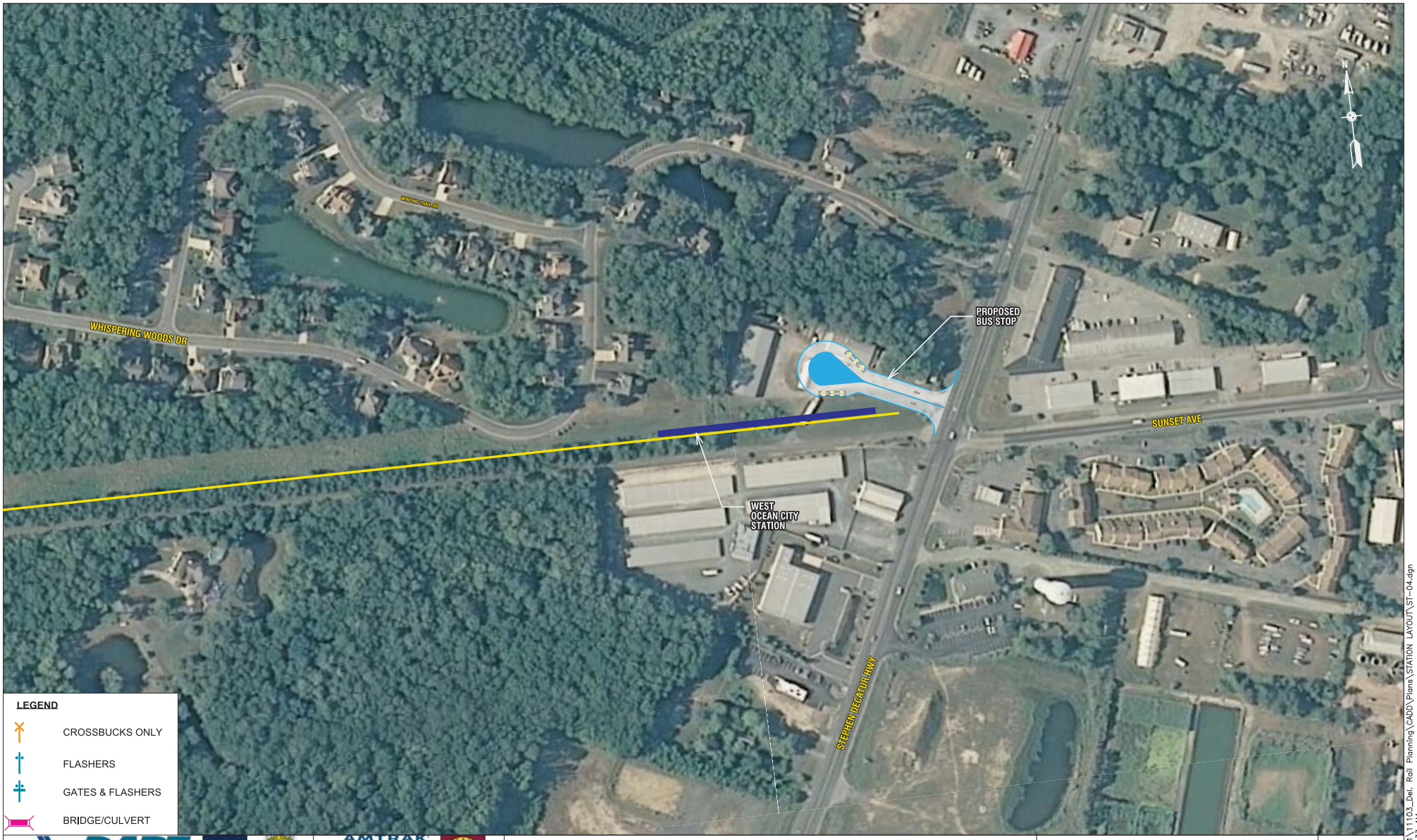

DELMARVA
INTERCITY RAIL STUDY

WEST OCEAN CITY STATION

DATE: JULY 2012 SCALE: 1"=100'

CONTRACT NO.

DRAWING NO. ST-04

SHEET NO.

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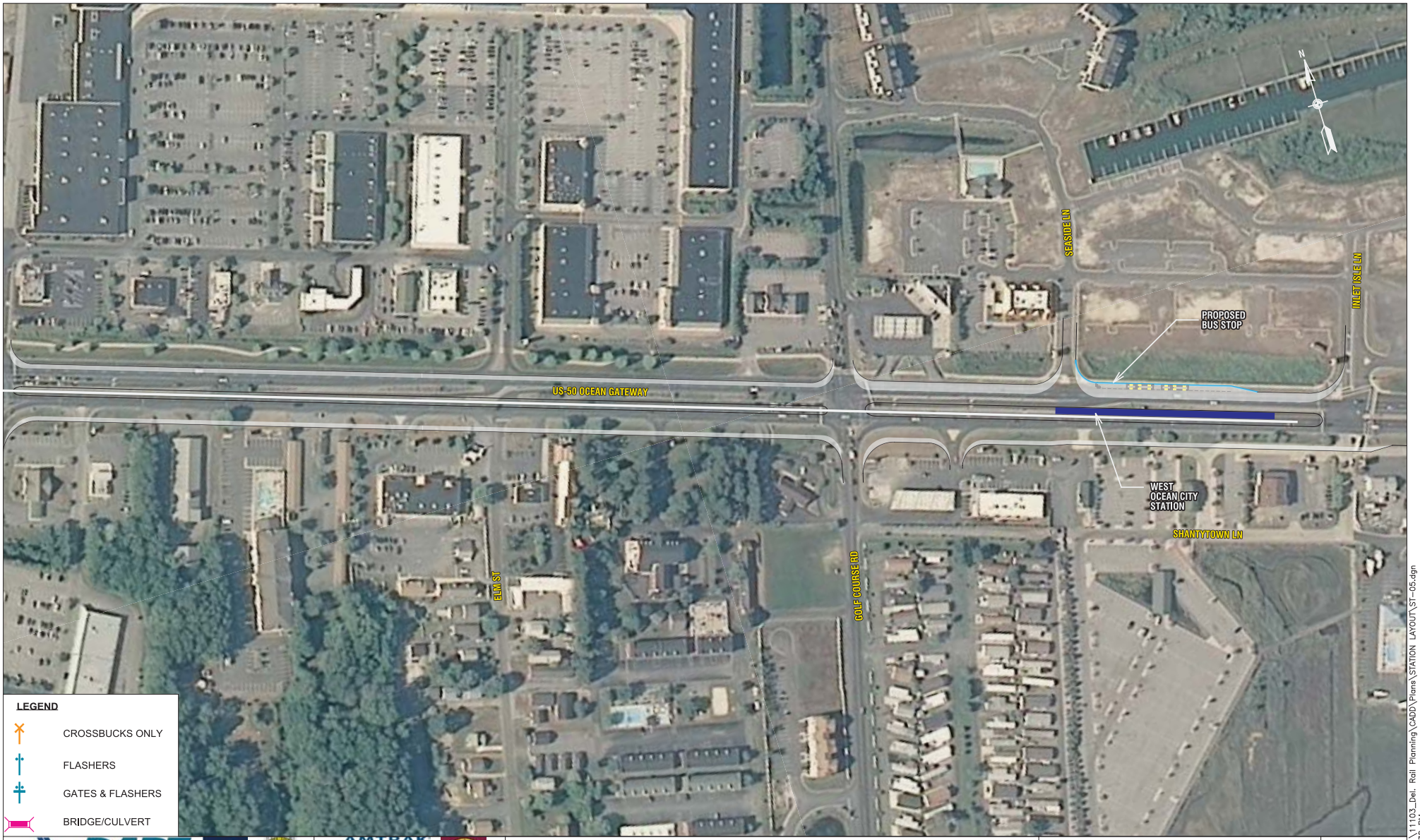

DelDOT | DART A Division of DelDOT Getting There Starts Here | Dover/Kent County MPO | Maryland Department of Transportation | SEPTA | WILMAPCO Wilmington Area Planning Council

AMTRAK | NORFOLK SOUTHERN

DELMARVA
INTERCITY RAIL STUDY

WEST OCEAN CITY STATION

DATE: JULY 2012 SCALE: 1"=100'

CONTRACT NO.

DRAWING NO. ST-05

SHEET NO.

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Appendix VI

Pro Forma Financial Summary

Financial Summary

Weekday/Weekend Service

Option	2018			2030			Total 2018 - 2038		
	O&M Costs	Rev	Operating Loss (Annual Subsidy)	O&M Costs	Rev	Operating Loss (Annual Subsidy)	O&M Costs	Rev	Operating Loss (Total Subsidy)
Option1A	$ 8,205,505	$ 3,735,762	$ (4,469,743)	$ 10,640,045	$ 5,910,419	($4,729,626)	$ 215,958,033	$ 118,090,255	$ (97,867,778)
Option1B	$ 8,636,315	$ 3,799,265	$ (4,837,051)	$ 11,211,145	$ 6,010,888	($5,200,257)	$ 227,527,585	$ 120,097,621	$ (107,429,964)
Option2A	$ 3,164,687	$ 1,780,212	$ (1,384,476)	$ 4,145,456	$ 2,816,506	($1,328,950)	$ 84,065,746	$ 56,273,829	$ (27,791,917)
Option2B	$ 3,384,699	$ 1,812,923	$ (1,571,776)	$ 4,421,635	$ 2,868,260	($1,553,375)	$ 89,687,272	$ 57,307,874	$ (32,379,397)
Option3A	$ 3,134,102	$ 1,737,188	$ (1,396,914)	$ 4,097,066	$ 2,748,437	($1,348,628)	$ 83,098,908	$ 54,913,816	$ (28,185,092)
Option3B	$ 3,351,996	$ 1,754,097	$ (1,597,899)	$ 4,369,894	$ 2,775,189	($1,594,705)	$ 88,653,492	$ 55,448,312	$ (33,205,181)
Option4A	$ 5,573,308	$ 2,391,841	$ (3,181,466)	$ 7,215,887	$ 3,784,176	($3,431,711)	$ 146,478,158	$ 75,607,897	$ (70,870,262)
Option4B	$ 5,956,439	$ 2,465,710	$ (3,490,729)	$ 7,699,087	$ 3,901,046	($3,798,041)	$ 156,309,413	$ 77,942,948	$ (78,366,464)
Option5	$ 4,334,430	$ 1,650,252	$ (2,684,178)	$ 5,600,455	$ 2,610,895	($2,989,560)	$ 113,705,958	$ 52,165,719	$ (61,540,239)
Option6A	$ 3,211,158	$ 2,014,305	$ (1,196,853)	$ 4,218,979	$ 3,186,870	($1,032,109)	$ 85,534,733	$ 63,673,697	$ (21,861,036)
Option6B	$ 3,437,940	$ 2,075,597	$ (1,362,344)	$ 4,505,869	$ 3,283,840	($1,222,029)	$ 91,370,276	$ 65,611,172	$ (25,759,104)
Option7A	$ 3,287,228	$ 2,322,739	$ (964,490)	$ 4,339,330	$ 3,674,848	($664,482)	$ 87,939,363	$ 73,423,512	$ (14,515,851)
Option7B	$ 3,511,849	$ 2,366,415	$ (1,145,435)	$ 4,622,802	$ 3,743,949	($878,853)	$ 93,706,589	$ 74,804,149	$ (18,902,440)
Option8A	$ 3,207,575	$ 2,009,883	$ (1,197,692)	$ 4,213,310	$ 3,179,874	($1,033,436)	$ 85,421,473	$ 63,533,915	$ (21,887,558)
Option8B	$ 3,433,310	$ 2,063,726	$ (1,369,583)	$ 4,498,543	$ 3,265,060	($1,233,483)	$ 91,223,888	$ 65,235,936	$ (25,987,952)
Option9A	$ 3,242,102	$ 2,180,873	$ (1,061,229)	$ 4,267,934	$ 3,450,399	($817,535)	$ 86,512,869	$ 68,939,021	$ (17,573,847)
Option9B	$ 3,466,766	$ 2,226,361	$ (1,240,405)	$ 4,551,475	$ 3,522,367	($1,029,107)	$ 92,281,469	$ 70,376,946	$ (21,904,524)
Option10A	$ 5,480,019	$ 2,090,294	$ (3,389,724)	$ 7,068,293	$ 3,307,094	($3,761,199)	$ 143,529,225	$ 66,075,776	$ (77,453,449)
Option10B	$ 5,864,089	$ 2,167,081	$ (3,697,008)	$ 7,552,979	$ 3,428,579	($4,124,399)	$ 153,390,169	$ 68,503,061	$ (84,887,109)
Weekend1A	$ 3,444,951	$ 1,360,214	$ (2,084,737)	$ 4,440,808	$ 2,152,019	($2,288,788)	$ 90,179,909	$ 42,997,376	$ (47,182,533)
Weekend1B	$ 3,617,233	$ 1,368,967	$ (2,248,266)	$ 4,656,670	$ 2,165,868	($2,490,802)	$ 94,574,444	$ 43,274,076	$ (51,300,367)
Weekend1C (Fri-Sun only)	$ 2,200,613	$ 1,174,131	$ (1,026,482)	$ 2,864,809	$ 1,857,614	($1,007,194)	$ 58,126,415	$ 37,115,161	$ (21,011,254)

All Costs and Revenue in Nominal $

Daily Service

	2018			2030			Total 2018 - 2038			One Way Trains	
Option (With Weekend Service)	O&M Costs	Rev	Operating Loss (Annual Subsidy)	O&M Costs	Rev	Operating Loss (Annual Subsidy)	O&M Costs	Rev	Operating Loss (Total Subsidy)	Weekend	Weekday
Option1A	$ 11,650,456	$ 5,095,976	$ (6,554,480)	$ 15,080,853	$ 8,062,439	$ (7,018,414)	$ 306,137,943	$ 161,087,631	$ (145,050,311)	6	6
Option1B	$ 12,253,548	$ 5,168,232	$ (7,085,316)	$ 15,867,815	$ 8,176,756	$ (7,691,059)	$ 322,102,028	$ 163,371,697	$ (158,730,331)	6	6
Option2A	$ 4,493,331	$ 2,428,397	$ (2,064,933)	$ 5,875,634	$ 3,842,013	$ (2,033,621)	$ 119,169,980	$ 76,763,471	$ (42,406,509)	2	2
Option2B	$ 4,802,346	$ 2,466,164	$ (2,336,182)	$ 6,258,209	$ 3,901,764	$ (2,356,446)	$ 126,966,812	$ 77,957,287	$ (49,009,525)	2	2
Option3A	$ 4,449,904	$ 2,369,708	$ (2,080,196)	$ 5,807,047	$ 3,749,160	$ (2,057,887)	$ 117,799,410	$ 74,908,269	$ (42,891,141)	2	2
Option3B	$ 4,755,945	$ 2,386,140	$ (2,369,805)	$ 6,184,977	$ 3,775,157	$ (2,409,821)	$ 125,503,331	$ 75,427,679	$ (50,075,652)	2	2
Option4A	$ 8,621,476	$ 3,316,790	$ (5,304,686)	$ 11,103,577	$ 5,247,555	$ (5,856,022)	$ 225,498,374	$ 104,846,228	$ (120,652,146)	4	4
Option4B	$ 9,154,718	$ 3,412,011	$ (5,742,706)	$ 11,777,116	$ 5,398,207	$ (6,378,909)	$ 239,200,589	$ 107,856,244	$ (131,344,345)	4	4
Option6A	$ 4,559,312	$ 2,747,726	$ (1,811,587)	$ 5,979,843	$ 4,347,228	$ (1,632,614)	$ 121,252,388	$ 86,857,676	$ (34,394,712)	2	2
Option6B	$ 4,877,887	$ 2,823,484	$ (2,054,403)	$ 6,377,431	$ 4,467,087	$ (1,910,344)	$ 129,349,376	$ 89,252,463	$ (40,096,913)	2	2
Option7A	$ 4,667,319	$ 3,168,462	$ (1,498,857)	$ 6,150,425	$ 5,012,882	$ (1,137,543)	$ 124,661,145	$ 100,157,457	$ (24,503,688)	2	2
Option7B	$ 4,982,752	$ 3,219,091	$ (1,763,661)	$ 6,542,933	$ 5,092,984	$ (1,449,949)	$ 132,656,805	$ 101,757,892	$ (30,898,913)	2	2
Option8A	$ 4,659,027	$ 2,731,266	$ (1,927,762)	$ 6,098,738	$ 4,321,187	$ (1,777,552)	$ 123,683,557	$ 86,337,367	$ (37,346,189)	2	2
Option8B	$ 4,981,991	$ 2,790,734	$ (2,191,257)	$ 6,499,914	$ 4,415,272	$ (2,084,642)	$ 131,856,961	$ 88,217,202	$ (43,639,759)	2	2
Option9A	$ 4,709,177	$ 2,963,626	$ (1,745,550)	$ 6,177,807	$ 4,688,809	$ (1,488,998)	$ 125,263,812	$ 93,682,462	$ (31,581,350)	2	2

Appendix VII

Options Demand Forecast Ridership and Revenue

Forecast Results for Proposed Delmarva Service Options

(prepared 3/23/12)

Option		One-Way Trains per Day	Operating Days	Annual Totals (2030 Forecast Year) for New DelMarVa Route (off-corridor trips)* with Low Fares ($0.14/mile; 2011$)** Ridership	Ticket Revenue (2011$)	Passenger Miles	with High Fares ($0.28/mile; 2011$)** Ridership	Ticket Revenue (2011$)	Passenger Miles	Average Travel Times NY-Berlin	NY-W OC	NY-Lewes	Was-Berlin	Was-W OC	Was-Lewes
Weekend1A	Weekend only service (Sa, Su) with one train from Berlin to NYC, one round trip from NYC to Berlin, one round trip from WAS to Berlin, and one train from NYC to Berlin	6	104	49,000	$2,283,000	7,050,000	45,500	$2,692,000	6,580,000	4:38	-	-	3:50	-	-
Allocated to NEC					*$1,140,000*	*3,160,000*		*$1,291,000*	*3,000,000*	(2 thru round trips on weekends only)			(1 thru round trip on weekends only)		
Allocated to DelMarVa					*$1,143,000*	*3,890,000*		*$1,401,000*	*3,580,000*						
Weekend1B	Weekend only service (Sa, Su) with one train from WOC to NYC, one round trip from NYC to WOC, one round trip from NYC to WOC, and one train from NYC to WOC	6	104	49,300	$2,299,000	7,100,000	45,800	$2,709,000	6,620,000	4:38	4:46	-	3:50	3:58	-
Allocated to NEC					*$1,147,000*	*3,160,000*		*$1,299,000*	*2,990,000*	(2 thru round trips on weekends only)			(1 thru round trip on weekends only)		
Allocated to DelMarVa					*$1,152,000*	*3,940,000*		*$1,410,000*	*3,630,000*						
Option1A	Weekday only service with one train from Berlin to NYC, one round trip from NYC to Berlin, one round trip from WAS to Berlin, and one train from NYC to Berlin	6	260	138,000	$6,474,000	19,650,000	128,500	$7,588,000	18,370,000	4:38	-	-	3:50	-	-
Allocated to NEC					*$3,322,000*	*9,100,000*		*$3,748,000*	*8,640,000*	(2 thru round trips)			(1 thru round trip)		
Allocated to DelMarVa					*$3,152,000*	*10,550,000*		*$3,840,000*	*9,730,000*						
Option1B	Weekday only service with one train from WOC to NYC, one round trip from NYC to WOC one round trip from WAS to WOC and one train from NYC to WOC	6	260	139,900	$6,566,000	19,930,000	130,000	$7,677,000	18,600,000	4:38	4:46	-	3:50	3:58	-
Allocated to NEC					*$3,370,000*	*9,020,000*		*$3,792,000*	*8,570,000*	(2 thru round trips)			(1 thru round trip)		
Allocated to DelMarVa					*$3,196,000*	*10,910,000*		*$3,885,000*	*10,030,000*						
Option2A	Weekday only service with one Round trip from Berlin to WAS and a transfer in Newark to NYC	2	260	67,600	$3,118,000	9,580,000	63,000	$3,639,000	8,950,000	4:45	-	-	3:50	-	-
Allocated to NEC					*$1,619,000*	*4,460,000*		*$1,813,000*	*4,230,000*	(1 connect round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,499,000*	*5,120,000*		*$1,826,000*	*4,720,000*						
Option2B	Weekday only service with one round trip from WOC to WAS and a transfer in Newark to/from NYC	2	260	68,300	$3,136,000	9,740,000	63,500	$3,670,000	9,080,000	4:45	4:53	-	3:50	3:58	-
Allocated to NEC					*$1,616,000*	*4,460,000*		*$1,809,000*	*4,230,000*	(1 connect round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,520,000*	*5,280,000*		*$1,861,000*	*4,850,000*						
Option3A	Weekday only service with one round trip from Berlin to NYC and a transfer in Newark to/from WAS	2	260	63,800	$3,134,000	9,210,000	59,600	$3,635,000	8,640,000	4:38	-	-	4:26	-	-
Allocated to NEC					*$1,642,000*	*4,460,000*		*$1,849,000*	*4,240,000*	(1 thru round trip)			(1 connect round trip)		
Allocated to DelMarVa					*$1,492,000*	*4,750,000*		*$1,786,000*	*4,400,000*						
Option3B	Weekday only service with one round trip from WOC to NYC and a transfer in Newark to/from WAS	2	260	64,200	$3,143,000	9,290,000	59,900	$3,650,000	8,700,000	4:38	4:46	-	4:26	4:34	-
Allocated to NEC					*$1,639,000*	*4,460,000*		*$1,846,000*	*4,240,000*	(1 thru round trip)			(1 connect round trip)		
Allocated to DelMarVa					*$1,504,000*	*4,830,000*		*$1,804,000*	*4,460,000*						
Option4A	Weekday only service with one round trip from Berlin to NYC and one round trip from Berlin to WAS	2	260	90,200	$4,074,000	12,710,000	83,900	$4,793,000	11,860,000	4:38	-	-	3:50	-	-
Allocated to NEC					*$2,081,000*	*5,750,000*		*$2,338,000*	*5,450,000*	(1 thru round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,993,000*	*6,960,000*		*$2,455,000*	*6,410,000*						
Option4B	Weekday only service with one round trip from WOC to NYC and one round trip from Berlin to WAS	2	260	92,300	$4,124,000	13,040,000	85,500	$4,872,000	12,140,000	4:38	4:46	-	3:50	3:58	-
Allocated to NEC					*$2,081,000*	*5,750,000*		*$2,339,000*	*5,460,000*	(1 thru round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$2,043,000*	*7,290,000*		*$2,533,000*	*6,680,000*						
Option5	Weekday only service with one round trip from Lewes to WAS and one round trip from Lewes to NYC	2	260	65,700	$3,385,000	9,450,000	61,900	$3,835,000	8,930,000	-	-	4:11	-	-	3:31
Allocated to NEC					*$1,929,000*	*5,150,000*		*$2,150,000*	*4,910,000*	(1 thru round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,456,000*	*4,300,000*		*$1,685,000*	*4,020,000*						
Option6A	Weekday only service with one round trip from Berlin to WAS and a transfer in Newark to/from NYC	2	260	72,900	$3,346,000	10,620,000	67,700	$3,948,000	9,890,000	4:55	-	-	3:50	-	-
Allocated to NEC					*$1,660,000*	*4,700,000*		*$1,874,000*	*4,440,000*	(1 connect round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,686,000*	*5,920,000*		*$2,074,000*	*5,450,000*						

Option		One-Way Trains per Day	Operating Days	Annual Totals (2030 Forecast Year) for New DelMarVa Route (off-corridor trips)* with Low Fares ($0.14/mile; 2011$)** Ridership	Ticket Revenue (2011$)	Passenger Miles	with High Fares ($0.28/mile; 2011$)** Ridership	Ticket Revenue (2011$)	Passenger Miles	Average Travel Times NY-Berlin	NY-W OC	NY-Lewes	Was-Berlin	Was-W OC	Was-Lewes
Option6B	Weekday only service with one round trip from WOC to WAS and a transfer in Newark to/from NYC	2	260	74,500	$3,388,000	10,890,000	68,900	$4,013,000	10,120,000	4:55	5:03	-	3:50	3:58	-
Allocated to NEC					*$1,660,000*	*4,710,000*		*$1,874,000*	*4,450,000*	(1 connect round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,728,000*	*6,180,000*		*$2,139,000*	*5,670,000*						
Option7A	Weekday only service with one round trip from Berlin to NYC and a transfer in Newark to/from WAS	2	260	81,200	$3,969,000	12,020,000	75,600	$4,651,000	11,230,000	4:38	-	-	4:28	-	-
Allocated to NEC					*$1,986,000*	*5,530,000*		*$2,254,000*	*5,240,000*	(1 thru round trip)			(1 connect round trip)		
Allocated to DelMarVa					*$1,983,000*	*6,490,000*		*$2,397,000*	*5,990,000*						
Option7B	Weekday only service with one round trip from WOC to NYC and a transfer in Newark to/from WAS	2	260	82,500	$3,997,000	12,210,000	76,600	$4,697,000	11,390,000	4:38	4:46	-	4:28	4:36	-
Allocated to NEC					*$1,984,000*	*5,530,000*		*$2,254,000*	*5,240,000*	(1 thru round trip)			(1 connect round trip)		
Allocated to DelMarVa					*$2,013,000*	*6,680,000*		*$2,443,000*	*6,150,000*						
Option8A	Weekday only service with one round trip from WAS to Berlin and a transfer in Newark to/from NYC	2	260	72,600	$3,334,000	10,550,000	67,300	$3,935,000	9,830,000	4:45	-	-	3:50	-	-
Allocated to NEC					*$1,651,000*	*4,670,000*		*$1,865,000*	*4,420,000*	(1 connect round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,683,000*	*5,880,000*		*$2,070,000*	*5,410,000*						
Option8B	Weekday only service with one round trip from WAS to WOC and a transfer in Newark to/from NYC	2	260	74,000	$3,362,000	10,790,000	68,400	$3,985,000	10,030,000	4:45	4:53	-	3:50	3:58	-
Allocated to NEC					*$1,644,000*	*4,660,000*		*$1,858,000*	*4,410,000*	(1 connect round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,718,000*	*6,130,000*		*$2,127,000*	*5,620,000*						
Option9A	Weekday only service with one round trip from NYC to Berlin and a transfer in Newark to/from WAS	2	260	76,100	$3,674,000	11,230,000	70,800	$4,314,000	10,480,000	4:38	-	-	4:11	-	-
Allocated to NEC					*$1,816,000*	*5,090,000*		*$2,063,000*	*4,820,000*	(1 thru round trip)			(1 connect round trip)		
Allocated to DelMarVa					*$1,858,000*	*6,140,000*		*$2,251,000*	*5,660,000*						
Option9B	Weekday only service with one round trip from NYC to WOC and a transfer in Newark to /fromWAS	2	260	77,400	$3,704,000	11,420,000	71,800	$4,361,000	10,640,000	4:38	4:46	-	4:11	4:19	-
Allocated to NEC					*$1,816,000*	*5,090,000*		*$2,062,000*	*4,820,000*	(1 thru round trip)			(1 connect round trip)		
Allocated to DelMarVa					*$1,888,000*	*6,330,000*		*$2,299,000*	*5,820,000*						
Option10A	Weekday only service with one round trip from NYC to Berlin and one round trip from Berlin to WAS	4	260	80,100	$3,340,000	10,860,000	74,000	$3,981,000	10,080,000	4:38	-	-	3:50	-	-
Allocated to NEC					*$1,635,000*	*4,560,000*		*$1,837,000*	*4,320,000*	(1 thru round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,705,000*	*6,300,000*		*$2,144,000*	*5,760,000*						
Option10B	Weekday only service with one round trip from NYC to WOC and one round trip from WOC to WAS	4	260	82,100	$3,391,000	11,200,000	75,700	$4,061,000	10,360,000	4:38	4:46	-	3:50	3:58	-
Allocated to NEC					*$1,635,000*	*4,570,000*		*$1,836,000*	*4,320,000*	(1 thru round trip)			(1 thru round trip)		
Allocated to DelMarVa					*$1,756,000*	*6,630,000*		*$2,225,000*	*6,040,000*						

These forecasts are based solely upon information available to AECOM as of 3/23/12.
These forecasts are provided for the sole use of Amtrak. They are not intended for disclosure in a financial offering statement.
Notes:

* Ridership, Ticket Revenue, and Passenger-Miles for only trips with at least one off-corridor trip end (similar to reporting rules for current off-corridor routes 12, 14, 46 & 47)

** All Ticket Revenue reported in 2011$; low/high pricing per-mile applies only to off-corridor segment