Chesapeake Connector Economic Benefits Study

Submitted to the Wilmington Area Planning Council

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WILMAPCO

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If the Appendices are not included in this printed report, they can be found at
http://www.wilmapco.org/chesapeakeconnector/

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Acknowledgements

The project team would like to express their gratitude to the following interview participants for their time and valuable analysis:

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Executive Summary

This report is a benefits and feasibility study of the Chesapeake Connector project, a proposal to relieve a bottleneck on the Amtrak Northeast Corridor (NEC) between the Bacon and Prince Interlockings, a 6.3 mile two-track section of the NEC between Perryville, Maryland and North East, Maryland. This section of track is one of the few remaining two-track segments along this heavily traveled rail corridor that is generally three or more tracks. The addition of a third track in this location would both alleviate the bottleneck and improve a safety concern for both freight and passenger rail services. Construction of the Chesapeake Connector has the potential to benefit multiple public and private partners. This project has been a recognized regional need for more than a decade, but has taken on increased importance as freight, intercity and commuter traffic has continued to increase, putting additional pressure on this 100-year-old network.

The purpose of this report is to revisit previous studies and findings while also considering recent developments in the region to determine the most feasible engineering and operational recommendations for this project. Recent developments include: changes at the nearby ports (Baltimore and Wilmington); BRAC-related job relocations to the Aberdeen Proving Ground that are expanding the number of households within the region and the potential demand for commuter rail service; future potential for high speed rail in the corridor; shifting freight demand in the region, and; the proposed reconstruction of the Susquehanna River NEC Bridge. The analysis developed in this report assesses the benefits of the Chesapeake Connector project as an independent project. However, these recommendations may also be carried forward as part of the Susquehanna River Bridge Project.

After the data collection and analysis were concluded for this study, the Maryland Transit Administration (MTA) announced plans to construct a new maintenance and layover facility for its Maryland Area Regional Commuter (MARC) trains at a location just north of Perryville, MD, between the Perry interlocking and the two-track segment of the NEC. This facility location could affect major changes on MARC's Penn Line, which operates on the NEC. Also, Norfolk Southern Corporation (NS) has begun shipping crude oil from the western United States to the PBF Refinery in Delaware City, DE via the NEC. This has added 4-5 trains per day to the traffic along the Chesapeake Connector project section. It is suspected that these two factors may have an impact on the Benefit Cost Analysis (BCA) that is included in this report.

The Chesapeake Connector Project suggests two design alternatives which are being considered for cost estimation, as well as the No-Build scenario, and an infeasible option that was ruled out, for the 6.3-mile corridor. Option A would add a single third main track along the corridor and cross the NEC tracks 2 and 3 by a grade-separated structure over the NEC. This option will require a high level of engineering work because

of the design of the bridge structures involved. Structural improvements of three existing bridges and the construction of at least six new overpass/underpass structures are anticipated to accommodate the additional track. Option B would add a third track to the NEC at grade, between Bacon and Prince interlockings. This alignment differs from Option A in that it does not allow for a single continuous move between track 1 at Bacon and track 4 at Prince without the need to cross tracks 2 and 3 at either one of the interlockings. A third option which was originally considered but not estimated for costs was a tunneling option under the NEC in Charlestown, Maryland near MP 56.5. The option was reviewed and initially considered superior to at-grade Option B because it provided no conflicts. However, this option required dropping the top of rail elevation of the proposed track about 35 feet below existing top of rail at the point of crossing under the NEC. Field observation of the area indicated numerous streams and areas with substantial standing water. It is not apparently obvious that a practical engineering solution could be devised to solve this issue.

The cost estimate was based on existing resources available at the time when the conceptual level engineering task was performed. Data used to develop the estimate included aerial photos, Amtrak track chart data, which included mileage and location of overhead and under grade bridges, and very limited field reconnaissance. Unit prices used in the estimate are based on previous project experience with Amtrak and the NEC, and the opinion of experienced professionals such as contractors, railroads and agencies, and fabricators, as well as industry recognized estimating tools such as RS Means. It is not recommended that this estimate be used for application for funds, but instead as starting point for the next level of planning and design. Costs included herein, which were identified as being “Planning Level” (or Order of Magnitude), should be more extensively researched during the next level of design.

An engineer’s cost estimate was created for the two options that were developed. These were Options A, and B. Option A provides a third main track which is carried over tracks 2 and 3 (high speed lines) via an overhead grade separated structure. The conceptual cost estimate for Option A is $349.5 million. Option B also provides a third main track but crosses tracks 2 and 3 at grade, via use of additional switches at Bacon and Prince interlockings. The conceptual cost estimate for Option B is $162.2 million. It is important to note that Amtrak staff supported Option A when they were given the opportunity to evaluate the engineering results.

The Benefit Cost Analysis found that Option B would provide more benefits at a lower cost, resulting in a BC ratio of 1.03 over a 20-year analysis period (1.20 over a 30-year period) and with a 3 percent discount rate. Based on this initial study, the greatest beneficiaries of the project are shippers in the region, followed by the railroad. The public sector receives a diverse set of smaller benefits related to better scheduling and potentially shorter shipping times.

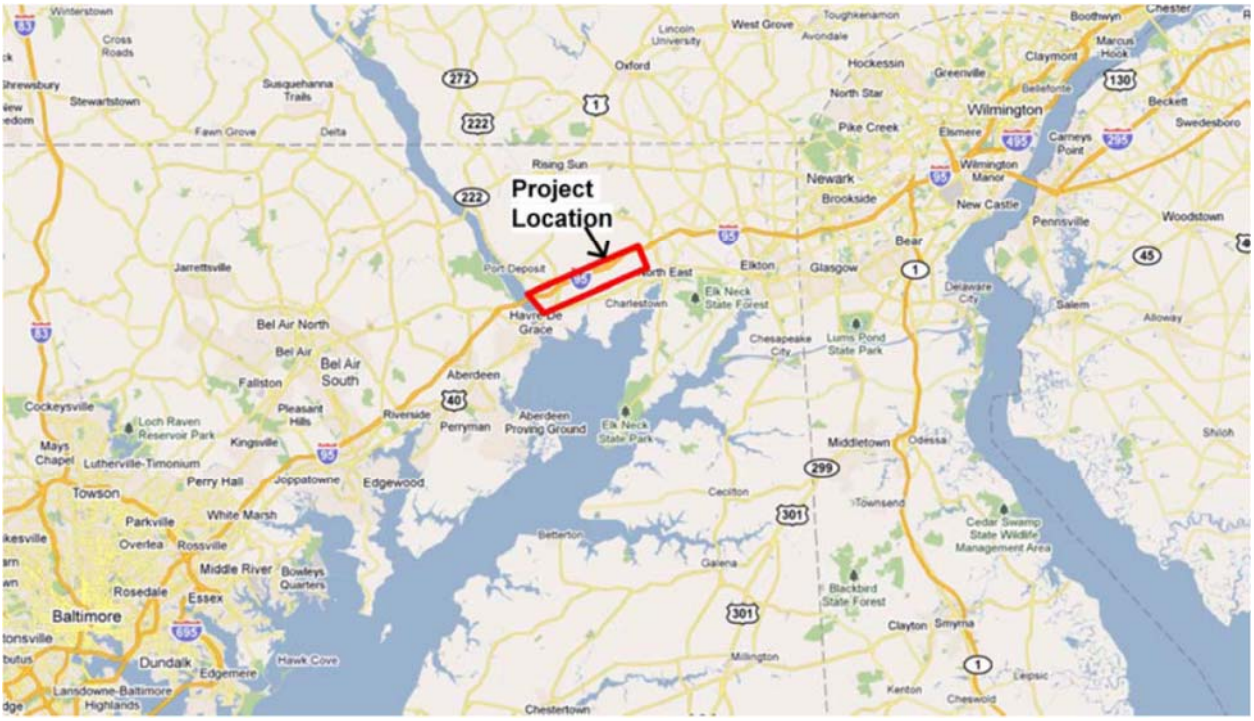
The conclusion of this report is consistent with prior studies that concluded that the Chesapeake Connector

would ease operations in the corridor but not generate large economic benefits relative to its cost[21]. The difference is that while past studies found the cost prohibitive relative to the benefits, this study finds that recent developments have altered conditions to suggest a small positive return on investment at the lower discount rate. This is not a strong argument for making the investment as the return is low even at a favorable discount rate.

This finding is tempered by additional knowledge that there are anticipated benefits that could not be quantified as part of this analysis that would likely raise the return. First, the benefits accruing to the railroad are likely understated in this analysis. While there may be direct savings from avoiding delays on the Port Road and the NEC, the impact of these delays on the broader Norfolk Southern network could not be estimated. Because rail service operates as a network, a delay at one point can have a cascading impact on operations on other locations physically connected to the delay point. Second, the benefits to shippers are also understated. The direct inventory costs of the delays are estimated, but the additional costs with holding "buffer" inventories to maintain production despite delays in supply deliveries and the costs of less efficient rail fleet utilization (for those shippers who own or lease their railcars) is omitted from the analysis. While both factors would raise the benefits estimated here, even a 20 percent increase in the estimated benefits (as a proxy for greater reliability for the railroad and shippers) would strengthen but not fundamentally changing the results of the analysis. It is exceptionally difficult to estimate what the effect of free-flowing rail access to Delaware or the Port of Baltimore would be on the regional economy.

Finally, the project's potential synergy as a part of the Susquehanna River Bridge improvements is a positive development as this likely increases the return on investment further, due to potential cost savings as part of a larger project's construction and because of the changes to rail traffic in the region that could alter both the volume and value of freight using the corridor.

Note: After the data collection and analysis of this study had been completed, NS began shipping crude oil to PBF Refinery in Delaware City via rail transit on this network, significantly increasing the volume (and economic value) traversing this already congested route. The new train trips have NOT been included in this analysis.



Introduction

This report is a benefits and feasibility study of the Chesapeake Connector project, a proposal to add a third track along the 6.3 mile section between the Prince Interlocking in Perryville, Maryland and the Bacon Interlocking in North East, Maryland. This section of track is one of the few remaining two-track segments along the heavily traveled Northeast Corridor (NEC) rail network that is generally three or more tracks. As such, the addition of a third track in this location would both alleviate a bottleneck for the NEC and a safety concern for both freight and passenger rail services. Construction of the Chesapeake Connector has the potential to benefit multiple public and private partners and it is a project with a long history of consideration in the region. The project received an evaluation in 2005, at which time it was concluded that the project's cost was prohibitive given current and foreseeable conditions in the corridor.

The purpose of this report is to revisit those findings to determine if recent developments in the region alter the resulting recommendations. Recent developments include: changes at the nearby ports (Baltimore and Wilmington); BRAC-related relocations to the Aberdeen Proving Ground that expand the number of households in the region and the potential demand for commuter rail service; future potential for high speed rail in the corridor; shifting freight demand in the region, and; the proposed reconstruction of the Susquehanna River NEC Bridge. The analysis developed in this report assesses the benefits of the Chesapeake Connector

project as an independent project.

The Chesapeake Connector project has become associated with the Susquehanna River Bridge project, which received federal High Speed Rail (HSR) funding for project development after this study was already underway. The two projects share a common point of concern, which is the intersection of the NEC and the Norfolk Southern Port Road, which is the primary route for freight trains traveling between Harrisburg, PA and the NEC, and by extension to both the Delmarva Peninsula and Baltimore, MD. Although this development is beyond the scope of the present study to evaluate, the combination of the bridge improvements and associated changes in rail traffic would be anticipated to increase benefits on both on the public side, through the additional rail capacity and likely improvement in reliability, and on the private side through network performance improvements achieved by the railroad.

The balance of this report summarizes the activities undertaken as part of this re-assessment. Chapter 2 summarizes the prior literature reviewed as part of this study. Chapter 3 describes the alternatives examined and provides an estimate of their capital cost. Chapter 4 describes passenger and freight operations in the section of the corridor that would use the Chesapeake Connector. Chapter 5 presents a benefit cost analysis of the project as a standalone project. Chapter 6 describes conclusions and findings.

Note: After the data collection and analysis of this study had been completed, NS began shipping crude oil to PBF Refinery in Delaware City via rail transit on this network, significantly increasing the volume (and economic value) traversing this already congested route. The new train trips have NOT been included in this analysis.

Chapter 1: Existing Document Summary

WILMAPCO staff provided the project team with approximately fifty existing documents and reports that are relevant to the Chesapeake Connector Freight and Passenger Rail Benefits Study. The team divided these reports by disciplines: Engineering Review, Travel Demand Review, Freight Review, Planning and Policy Review, and Combined Economic Assessment. This chapter serves as a summary of key findings organized by relevant disciplines.

Appendix A to this report aggregates the documents and reports into three groups: documents that are central to the Chesapeake Connector Study (core documents), documents that are not directly related but still contain useful information (supporting documents), and documents that are peripheral to the study. A brief summary of the data available in each document or report is provided by discipline.

Key Findings

Engineering Review

A comprehensive planning study of the Northeast Corridor conducted by Cambridge Systematics in 2009 identifies a program of 217 projects, including 110 capacity projects and 81 double stack (transporting two shipping containers stacked on a special railcar) clearance projects to help increase north-south rail capacity in the Mid-Atlantic region. The Chesapeake Connector Project is one of the projects included in this $12 billion program (in 2009$) that would encourage a greater shift in freight traffic from trucks to rail. Conservative estimates of this potential shift suggest that rail could capture the equivalent of 13 to 55 additional trains per day—removing a moderate amount of truck traffic from the region's highways and relieving some of the congestion pressure on the highways. A truck tanker carries 9,000 gallons, while a rail tank car has a 31,000 gallon capacity, or roughly the equivalent of 3.5 truck tankers.

The document also identifies practical trains per day, which is classified in terms of number of tracks, signalization control, and mix of train types. Of interest to the Chesapeake Connector Project is that for double track segments, the practical number of trains that can be scheduled per day is 75, based on an Association of American Railroads (AAR) National Rail Freight Infrastructure Capacity and Investment Study prepared by Cambridge Systematics in 2007. That number increases to 133 with the addition of a third track—increasing capacity by more than 77%. It is important to note that generally more conservative assumptions on capacity increases were applied in the Mid-Atlantic Rail Operations Study (MAROps); however, these capacity parameters are confidential and not reported in the document. Therefore, the AAR study capacity parameters provide a metric for the type of capacity increases that are possible with the addition of a third track.

(Document 24, I-95 Corridor Coalition Mid-Atlantic Rail Operation Study Phase II Final Report Document, December 2009, Cambridge Systematics)

A 2002 Feasibility Analysis performed by the Maryland Transit Administration for a service extension to Elkton provides a preliminary introduction to the operational issues, infrastructure requirements (including station requirements), potential ridership, and capital cost estimates for extending the Penn Line from Perryville to Elkton. The analysis mentions the possibility of a third track, but does not include it as part of this feasibility study, making it more difficult to overcome the operational issues discussed below.

The operational constraints in the Elkton area focus on the commuter rail service sharing track with Amtrak and freight rail. Amtrak trains require priority access to the high-speed track and cannot change track in order to meet their schedules. Schedule slotting the commuter rail service would be difficult due to the different speeds and stopping patterns associated with the various Amtrak train services and commuter rail. Additionally, the double track between Principio and Bacon is a significant bottleneck in a mixed traffic operating environment. Freight trains move much more slowly than passenger trains and are primarily limited to travel between 10:30pm and 6:30am in order to give passenger trains priority. However, routine and special track work is also typically performed during this freight traffic window, often limiting the available tracks to one, which could interfere with commuter service if early trains also need to operate through this bottleneck. The Penn Line trains that start in Perryville are also stored overnight in Baltimore and must make their way to Perryville during the freight traffic window. The addition of the four train movements required for the Elkton extension would add to this congestion during the end of the freight traffic window. The feasibility study mentions the investment in a third track from Prince Interlocking to North East and possibly Iron Hill; however, it notes that this is an extremely expensive option and may not be practical.

The station requirements for the Penn Line extension to Elkton would include additional lighting, signage, and various other passenger amenities, including updates to meet ADA requirements. Some provision would have to be made for parking. Preliminary cost estimates (including these station rehabilitation requirements, the retrofit of Perryville Station, and a layover facility only) range from $17 million to $44 million (in 2002$). Additionally, the incremental annual operating costs are projected to be in the $1 million to $2 million range (in 2002$), and include the labor costs associated with the additional train and engine crews, staffing for the layover facilities, and additional Amtrak access costs based on the additional train miles. (Document 31, Service Extension to Elkton: Feasibility Analysis, October 2002, Maryland Transit Administration)

A 2005 Phase II Study of Commuter Rail Service Extension Study performed by PB focused on the 14.5 mile stretch between Elkton, MD and Perryville, MD. The study analyzed the ridership potential, operational, and

engineering needs, as well as the environmental impacts for the following alternatives: 1) stopping a limited number of existing Amtrak trains in Elkton, similar to the two daily trains stopping in Newark, DE, 2) extending the existing level of MARC service at Perryville to Elkton, and 3) extending a more robust level of MARC service to Perryville and Elkton. The study found that extending the existing MARC service to Elkton was feasible without constructing additional track. However, this option would require some scheduling changes in order to avoid conflicts with Amtrak and freight services (as summarized above for Document 31). The report stated:

> "From an operating perspective, the existing level of MARC service at Perryville can be extended to Elkton Station (and peak service only as far as Wilmington, DE) without the necessity of adding additional track between Iron Hill and Perryville. However, it would be needed for a more robust level of service, with increased peak and off-peak service frequencies. It would not facilitate goods movement since current freight trains and those anticipated in the near future serving Delmarva customers are planned during early morning windows when conflicts with passenger trains are minimal."

The study also created a conceptual description of the improvements necessary to implement commuter rail service north to Newark, DE or Wilmington, DE. The identified improvements included: the construction/rehabilitation of passenger rail stations at Perryville, North East, and Elkton and the construction of a new layover facility near the northern terminal of commuter rail service. Additionally, the extension of Track 1 between Prince and Bacon Interlockings may be required if the frequency of service is expanded. This extension of Track 1 would include construction of new track and catenary, relocation of the adjacent maintenance-of-way access road, and widening a bridge over a local road. These conceptual improvements were estimated to range from $44 million to $50.6 million (in 2005$).

The study also reported that Norfolk Southern conducted an assessment of the Track 1 extension between Prince and Bacon interlockings in 2003. This assessment concluded that the additional track was an expensive undertaking, and while desirable from an operational point of view, the benefits of the project did not exceed the costs. As a result, the project did not advance internally with the railroad. (Document 34, Track A Extension Feasibility Study Phase II, October 2005, Parsons Brinckerhoff)

Travel Demand Review

Amtrak's Northeast Corridor (NEC) Infrastructure Master Plan discusses the Chesapeake Connector Study corridor, including the rationale for the third track between the Bacon and Prince Interlockings:

> "The two- and three-track NEC Main Line in northern Maryland will largely be at capacity by 2030. Three bridges in the section, at the Susquehanna, Bush, and Gunpowder rivers are all beyond their useful life. Replacement of all three bridges will also improve operating efficiencies. Potential track upgrades between Perry and Prince interlocking and new track to accommodate improved freight operations as well as expanded passenger service between Iron and Prince, and Grace and Bush interlocking will mitigate future bottlenecks. A new storage facility is needed to accommodate MARC 2030 commuter services in northern Maryland. Upon completion, the bridge and track improvements will create a three- and four-track Main Line through northern Maryland capable of accommodating Amtrak, improved freight and MARC future service plans."

While most of the document deals with Amtrak services outside the study area, there is information on the components of the Chesapeake Connector Project in the NEC Northern Maryland Bridge and Track Expansion Improvements, totaling $3.065 billion (in 2010$). These improvements include multiple projects from the fourth track at Iron to Prince Interlockings to the Union Terminal fourth track at Milepost 414.

Amtrak's NEC Plan also includes the projected number of daily movements in 2030, which are expected to increase from 80 Intercity Passenger Rail (IPR) trains to 110 IPR and from 0 commuter rail trains to 73 between Elkton and Perryville. While the document focuses on the rail passenger needs along the corridor, it recognizes the importance of freight movement and the anticipated growth in freight traffic along the NEC (Amtrak reports growth forecasts from the I-95 Coalition's MAROps report, Document 24) and the need to coordinate between intercity, commuter, and freight rail traffic. (Document 3, Northeast Corridor Infrastructure Master Plan, May 2010, Amtrak)

In addition to anticipated growth in intercity passenger rail service, the Maryland Area Regional Commuter (MARC) Growth and Investment Plan highlights commuter rail service improvements planned for MARC. This document summarizes the benefits of growth and investment of MARC service, ridership growth trends, existing system capacity issues during the peak period, and major programmed investments. The planned improvements for the Penn Line through 2035, including the extension of service from Perryville to Elkton, are highlighted here as they are most relevant to the Chesapeake Connector study area.

The benefits listed include better service for current riders through addressing existing problems with capacity, frequency, reliability, and mobility in central Maryland. The planned mobility framework shows that investments will provide fast, reliable transportation in key corridors, strengthen economic and social ties

between Baltimore and Washington, serve Base Realignment and Closure (BRAC) related travel markets, offer mobility choices for commuters and regional travelers, be an efficient and environmentally sustainable (air, water, energy) transportation investment, reduce the need to expand highways in areas with limited or expensive construction right-of-way, encourage efficient regional land use development and transit-oriented development (TOD), provide the backbone for an integrated Baltimore regional transit system, and support more efficient rail freight movements.

The objectives for the MARC Growth and Investment Plan include ridership and service improvements. MARC total ridership is at an all-time record level of over 30,000 daily riders, with growth at 6% annually over the past ten years (1997-2007). Ridership now exceeds peak period system capacity of approximately 27,000 daily trips. The demand is expected to continue to grow due to: Baltimore City's residential revitalization, suburban population growth, employment growth along the rail corridors including BRAC effects, ongoing highway congestion, expanded federal fare subsidy programs, and the high cost of gasoline.

There are, however, numerous capacity issues along the Penn Line corridor. MARC is currently operating at near-capacity, which threatens the ability of the system to meet demand with an acceptable level and quality of service. Sixty percent of Penn Line trains have standing passengers during the peak hours, and parking lots in Perryville, Aberdeen, Edgewood, Martin Airport, Penn Station, West Baltimore, Halethorpe, and Odenton are at or near capacity. Operations and maintenance facilities are also facing capacity issues as there are insufficient spare parts and train storage space both at Penn Station (overnight) and Washington (mid-day). Workshops are at capacity and cannot currently accommodate a larger fleet while infrastructure constraints and the presence of other operators (Amtrak and freight) are affecting MARC scheduling flexibility and service expansion plans.

To overcome these capacity issues along the corridor and to meet the ridership and service objectives for the future, MARC has developed an investment plan for all lines. The exhibit below summarizes the improvements planned for the Penn Line, including an extension from Perryville to Elkton, which occurs in the Chesapeake Connector study area.

Exhibit 1: Summary of Penn Line Improvements from the MARC Growth and Investment Plan

	2010	2015	2020	2035
Additional Daily Seats	3,400	12,000	16,000	13,000
Rail Service Improvements	• Lengthen trains • Additional peak and reverse peak trains • Late evening and weekend service	• Additional peak and reverse peak trains • Increase frequencies to Aberdeen • Peak service to Elkton and Newark • Connectivity to Baltimore Core services	• Introduction of limited stop trains at 30-minute intervals • Additional peak express service • N. VA extension	• Full 4-track railroad with "transit-like" service through Baltimore • Connectivity to Baltimore Subway
Incremental Capital Investments	$83M (2007$)	$990M (2007$)	$1.3B (2007$)	$570M (2007$)
Incremental Operating Cost	$7M/year (2007$)	$20M/year (2007$)	$14M/year (2007$)	$20M/year (2007$)

Source: MARC Growth and Investment Plan, September 2007, p.17
(Document 29, MARC Growth and Investment Plan, September 2007, MARC)

A 2002 Feasibility Analysis performed by the Maryland Transit Administration for a service extension to Elkton provides preliminary potential ridership for this new service. The potential market for the Elkton service reported in the feasibility analysis is based on employment in Cecil County. The document states that approximately 20,000 people commute outside the county (2002), with only 6,400 workers identified as commuting to other Maryland counties. Of this 6,400, only those destined to Downtown Baltimore, BWI, or Washington would contribute to the potential size of the MARC market to and from Elkton. Average daily boardings at Perryville were about 80-100 in 2002, and a license plate study showed that less than 2% of vehicles were from North East or beyond at the Perryville station. However, a revised 2005 study showed that a majority of the passengers come from Cecil County, while 43 percent reported Delaware zip codes and another 13 percent reported Pennsylvania zip codes—indicating that the Elkton station market may have improved in recent years. (Document 31, Service Extension to Elkton: Feasibility Analysis, October 2002, Maryland Transit Administration)

Additionally, a 2005 Phase II Study of Commuter Rail Service Extension Study performed by Parsons Brinkerhoff (PB) looked at the potential ridership impacts associated with extending rail service from Perryville to Elkton. The ridership estimates indicated that extending commuter rail service into Cecil County would be difficult to justify based on the current and projected demographic trends. The study did identify clusters of residential density in and around Elkton that meet the minimum thresholds for service and could generate sufficient commuter traffic to Philadelphia and Washington, DC, especially if longer distance riders drive to Cecil County from other states. If MARC service were extended northward, the study estimated that the new stations at Elkton and North East would attract approximately 331 weekday boardings in 2025. Additionally,

approximately 457 additional weekday boardings would be attracted if service was extended to Wilmington, DE. (Document 34, Track A Extension Feasibility Study Phase II, October 2005, Parsons Brinckerhoff),

Freight Review

WILMAPCO's Regional Freight and Goods Movement Analysis forecasts an increase in tonnages expected to move through the state by rail, truck, and container shipments. The area between Perryville, MD, and Newark, DE is noted as a bottleneck for rail because much of it is only two tracks, and Amtrak's prioritized use of the tracks during daytime hours limits freight movements. Adding a third track to be dedicated to freight would allow increased freight transport while improving safety of Amtrak riders by limiting the number of conflicts between carriers.

The Delaware Freight and Goods Movement Plan names the Perryville-Newark/Wilmington freight-dedicated track as the highest priority project among all modes. The document called for a study into the feasibility of a 21-mile track between Newark, DE and Perryville, MD primarily for freight. It was recommended that Delaware, Amtrak, and Maryland work together on the study. Cecil County, MD showed interest in extending commuter rail from Newark, which would support a shared track between freight and passenger rail services. The cost of the 21-mile third track was estimated at $60-75M in 2000, and it was anticipated that the benefits would include: unrestricted hours for NS to move freight east/west between Delaware and Maryland, the Delmarva industries would have better access to the NEC, and improved vertical clearances.

The Delaware Freight and Goods Movement Plan also identifies Delaware as a destination state for rail because 80% of rail traffic in the state terminates there. Coal and chemicals are top commodities, with Delaware-originating chemicals making up 38% of the traffic. Grains, minerals, non-metallic products, and transportation equipment are also high-tonnage commodities, and together with all other items, the state moved over 13 million tons in 2000 by rail. Anticipated freight tonnage growth on the order of 2.9% annually, or 87% by 2020, is expected. (Documents 36 and 37, Delaware Freight and Goods Movement Plan - Technical Report/Executive Summary, June 2004, Parsons)

The I-95 Corridor Coalition's study in 2002 identified six rail chokepoints and subsequently recommended that NS add a freight-only track for daytime operations between Perryville and Ragan Interlocking at a total cost of $135M within a 0 to 5 year timeframe (which would have been 2002-2007) as part of the MAROps program.

The I-95 Corridor study also identified freight in the WILMAPCO region as predominantly through-traffic with "considerable" growth expected. The region is a net exporter with 37 million truck tons flowing out and 26 million in. In 2003, 661 million tons of freight went into, out of, and within Maryland by truck and

rail, and by 2030 the tonnage is expected to grow by 75% to 1.2 billion tons. Forty percent of the weight transported by rail was coal in 2003, 11% was nonmetallic minerals, and metal products and waste or scrap materials were both 6%. (Document 35, WILMAPCO Regional Freight and Goods Movement Analysis, Final Report, September 2007, Cambridge Systematics and Global Insight)

Combined Economic Assessment

WILMAPCO's 2040 Regional Transportation Plan (RTP) lists the "Commuter Rail Gap," a 20-mile stretch of track between Perryville and Newark absent of passenger rail service, as the single most pressing transportation problem in the region. Passenger rail ridership on MARC's Penn Line at the Perryville station increased 22% between 2006 and 2008. The RTP does not list penalties or costs of not providing this service, but does state that WILMAPCO is partnering with MDOT, DelDOT, Norfolk Southern, and Amtrak to conduct a study to determine the benefit of adding an extra rail track to this corridor. The RTP lists the project in the "Financially Reasonable RTP Projects Short-Term 2011-2015" Category with an estimated cost of $15M (2010$) for the MARC extension and opening in 2020. (Document 40, WILMAPCO 2040 Regional Transportation Plan, January 2011, WILMAPCO)

The region is expected to go through demographic changes between 2010 and 2040, including an 11% increase in employment, 29% increase in households, 109% increase in the 65+ population, 21% increase in total population, 37% increase in VMT, and 58% increase in freight truck tonnages. These changes will force transportation improvement decisions to be made where the most benefit can be seen, including projects that encourage economic growth, safety for elderly populations, and efficient movements of the 57 million tons of freight in the WILMAPCO region annually. (Document 40, WILMAPCO 2040 Regional Transportation Plan, January 2011, WILMAPCO)

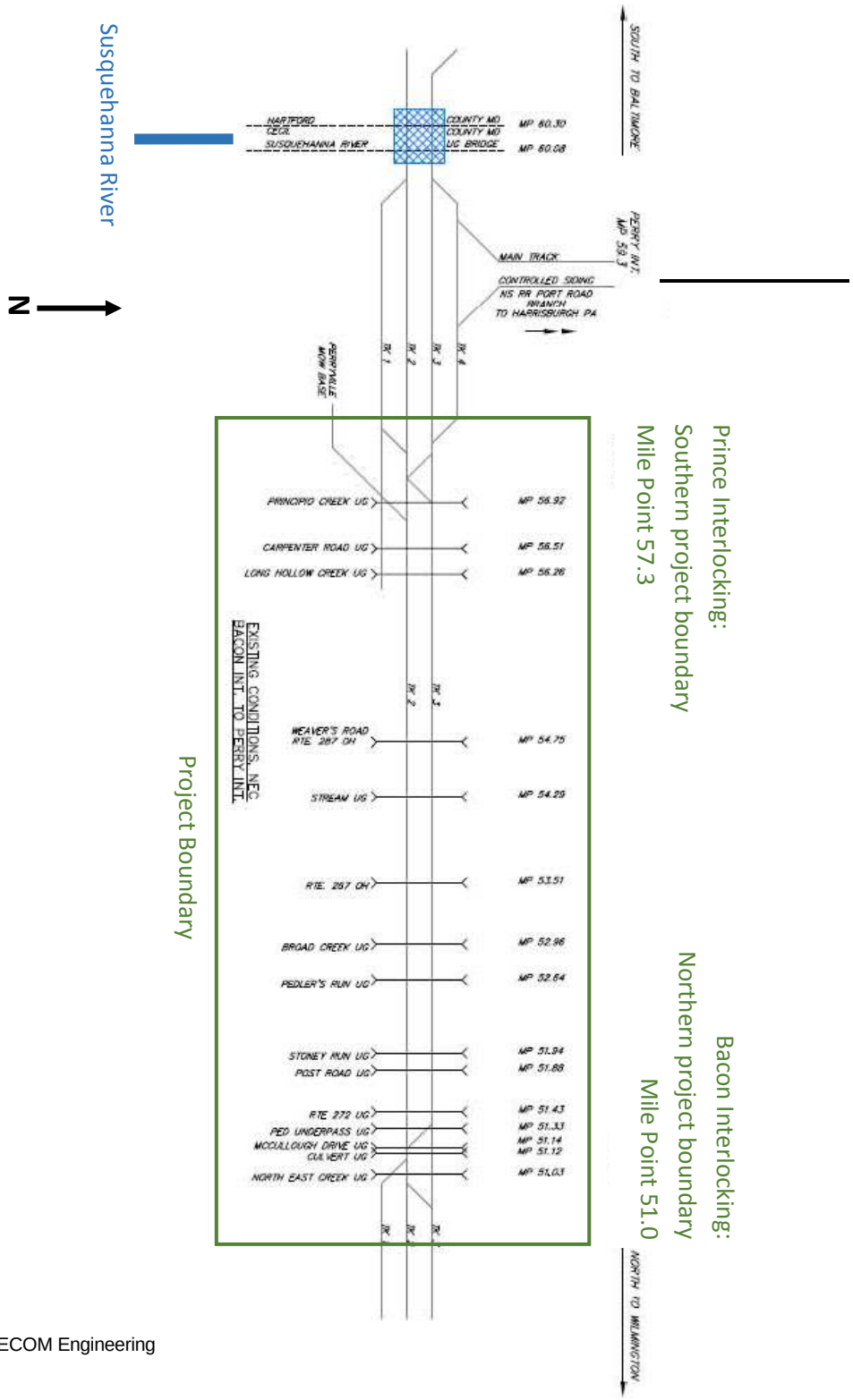
Chapter 2: Description of Alternatives

The Chesapeake Connector Project is designed to relieve a bottleneck in Maryland between the Bacon and Prince Interlockings. An interlocking is a configuration of tracks, signals, and switches which allows for safe train movements at junctions and crossings. Bacon Interlocking is located at Mile Post (MP) 57.3 and Prince Interlocking is located at MP 51.0 on the Northeast Corridor Mainline (NEC). There are two design alternatives which are being considered for costing, as well as the No-Build scenario and an infeasible option for the 6.3-mile corridor. The balance of this section describes each of the alternatives.

No-Build

This segment of the corridor is one of only two remaining segments along the Northeast Corridor (NEC) which has two tracks, rather than the more common three track configuration. The corridor expands to three tracks at the northern end at Bacon Interlocking; it expands to three tracks at the southern end at Prince Interlocking. The existing conditions can be seen in Exhibit 2. There are no sidings along this segment of the NEC. The reduction of track capacity from the more frequent four or three tracks to just two tracks creates a bottleneck for the passenger and freight rail traffic using the corridor. Passenger trains are given priority to use the corridor during the day between the hours of 6:00am and 10:00pm. Currently, the bottleneck between the interlocking prohibits freight movements along the corridor, as passenger rail has right of way during the day, so freight trains back up as they wait for a signal change. The Norfolk Southern (NS) freight trains are permitted to utilize the NEC intermittently through the day when passenger trains are not present, but because freight trains are longer and heavier they run much slower, which creates delays or conflicts for other freight and passenger trains along the corridor. For this reason, much of the NS movements occur during the night when passenger trains are not operating.

Exhibit 2: Existing Conditions and No-Build Option



Source: AECOM Engineering

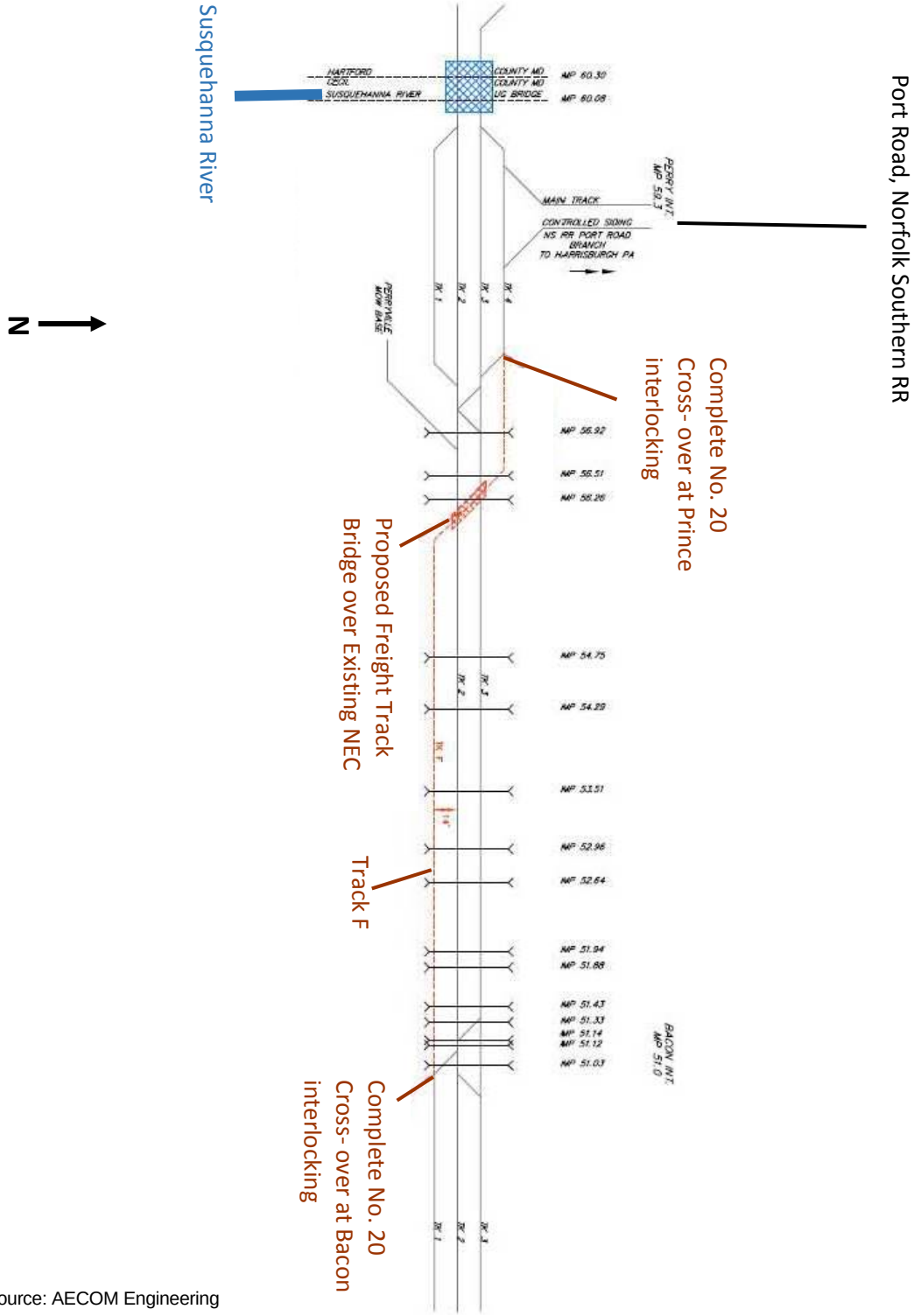
Option A

Option A would add a single third main track along the corridor and cross the NEC tracks 2 and 3 by a grade-separated structure over the NEC. This option will require a high level of engineering work because of the design of the bridge structures involved. Structural improvements of three existing bridges and the construction of at least six new structures are anticipated to accommodate the additional track.

The proposed third track grade separation would occur between Weavers Road (MD Route 267), MP 54.75 to the north, and the north limits of Prince Interlocking to the south. The main crossover of the NEC will occur between MP 56.51 and MP 55. The grade separation is proposed to be achieved using a combination of retained fill structures, short simple span structures, and a long straddle bent system structure for crossing the NEC tracks.

The alignment schematic, as illustrated in Exhibit 3, extends track 1 south from Bacon Interlocking. The new track, named track "F" is located on the east side of the existing tracks to the point of crossing the NEC. After crossing the NEC, track F locates on the west side of the existing tracks, and ties directly to track 4 at Prince Interlocking. Along the coast of the Northeast River, track F locates on the east side of the NEC, adjacent to the river. To avoid impacts to the river, a retaining wall is proposed to support the third track. Schematic changes to the interlocking include adding an additional No. 20 turnout to each interlocking, to create a cross-over configuration where track F ties to existing tracks 1 and 4.

Exhibit 3: Option A Alignment



Source: AECOM Engineering

Option B

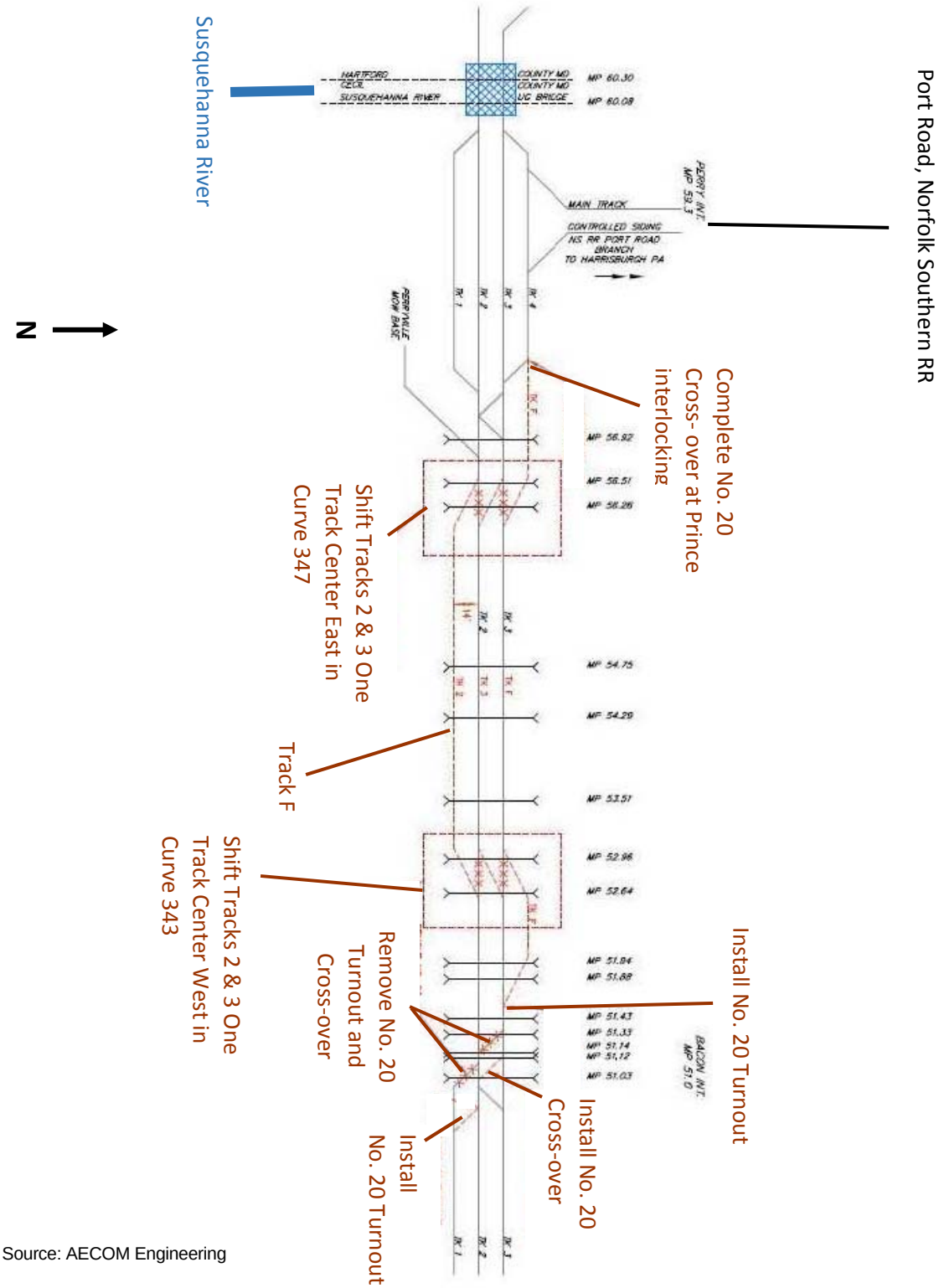
Option B would add a third track to the NEC at grade, between Bacon and Prince Interlockings. This alignment differs from Option A in that it does not allow for a single continuous move between track 1 at Bacon and track 4 at Prince without the need to cross tracks 2 and 3 at either one of the interlockings.

The alignment schematic, as illustrated in Exhibit 4, proposes to locate the proposed third track, called track "F" on the west side of the NEC. However, the existing railroad typical section within the project limits seems to favor placing the additional track on the east side. Therefore, this option proposes to shift the existing tracks one track center south through the majority of the project limits to take advantage of the additional space on the east side. It should be stated that with this shift, tracks 2 and 3 maintain a continuous straight line schematic.

Option B proposes to reconfigure Bacon Interlocking by moving one cross-over, and one turnout north, and installing one turnout at the south end of the interlocking. This turnout diverges to the west side, and is the north limit of track F. Immediately south of Bacon Interlocking, the NEC turns left (east). Amtrak's name for this curve is 343. Within this curve, the track centers would shift east by one track center. As such, at the south end of the curve existing track 3 would become track F, existing track 2 would become track 3, and a new proposed track would be constructed on the east side of existing track 2, which would become proposed track 2. This schematic is maintained until the curve immediately north of Prince Interlocking. Amtrak's name for this curve is 347. Within this curve, the track centers would shift west by one track center, such that when they become tangent at Prince Interlocking, they match the existing schematic. This would require constructing Track F on the west side of the NEC within most of curve 347, and Prince Interlocking. At Prince Interlocking a No. 20 turnout will be installed to create a cross-over configuration where track F ties to existing track 4. Of note is that the interlocking schematic at Prince does not allow for southbound moves on track F to cross to any other tracks. Alignment constraints, as related to lack of tangent track geometry preclude installation of additional special track work which would support these operations. Structural improvements to three existing bridges and the construction of at least seven new bridges are anticipated to accommodate the additional track. Numerous crash walls at overhead bridges will need to be reconstructed as well. As the in Option A, this option includes constructing a new track adjacent to the shoreline of the Northeast River. To support the track in this area, a retaining wall is proposed similar to that proposed in Option A.

Because Option B does not include a large bridge over the other two existing tracks, the capital cost is much lower. It will, however, increase the likelihood of conflict because all of the crossings are at-grade. Similarly, with the new cross-overs and turn-outs and the removal of existing track, there will be higher levels of interruption to freight and passenger rail traffic along the corridor during construction.

Exhibit 4: Option B Alignment



Source: AECOM Engineering

Common Elements of the Options

Both alignment Options A and B will have the same utilities requirements and site work. The environmental mitigation at the North East River will also be equal, as the track length and location will be identical in both options. The same is true for the power systems and signals. Approximately 1.5 acres of ROW are required for Option A and 1 acre for Option B. More land for Option A is required primarily due to the amount of space needed for the approaches associated with the grade separated structure.

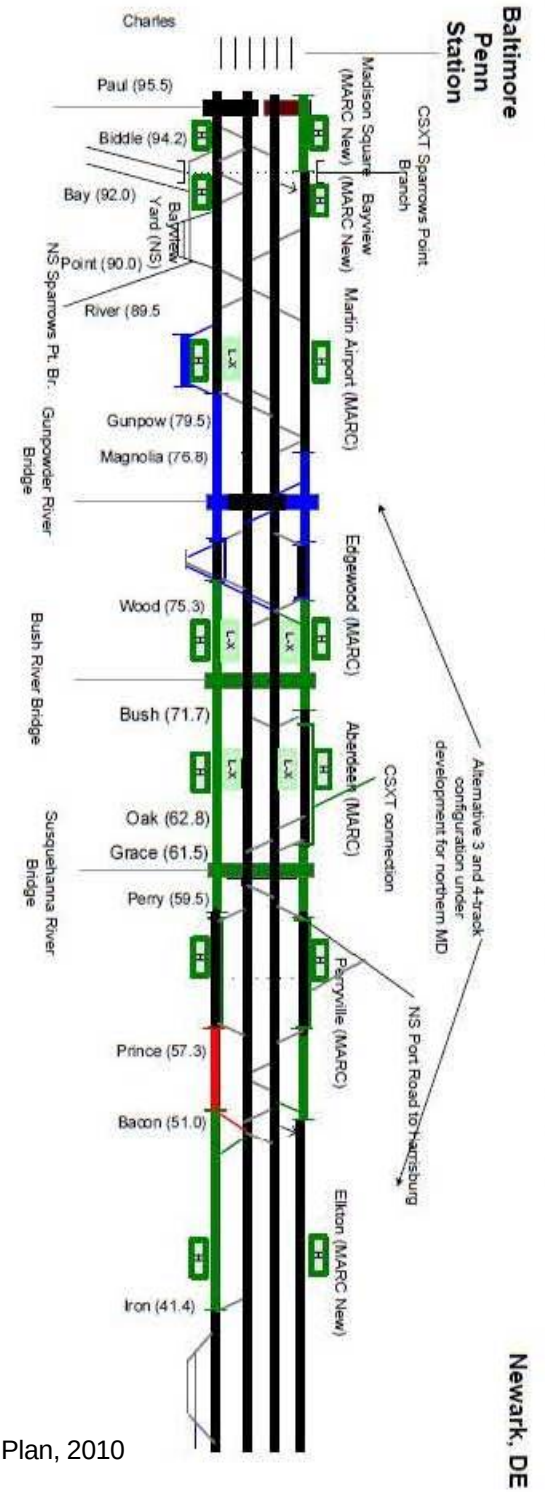
Option C

A third option which was originally considered but not estimated for costs was a tunneling option under the NEC in Charlestown, Maryland near MP 56.5. The option was reviewed and initially considered superior to at-grade Option B because it provided no conflicts. However, this option required dropping the top of rail elevation of the proposed track about 35 feet below existing top of rail at the point of crossing under the NEC. Field observation of the area indicated numerous streams and areas with substantial standing water. It is not apparently obvious that an engineering solution could be devised to solve this issue. One possible technique would be to engineer a bathtub type system with an extensive pumping plant. However, because the water issues are not fully understood, the need to move existing stream alignments, and the anticipated extensive environmental mitigation and right of way needs associated with those items, the design team was persuaded to eliminate Option C as a viable option.

Relation of No-Build and Options A and B to Proposed High-Speed Rail Improvements

Amtrak's anticipated high-speed rail (HSR) line will traverse the NEC parallel to existing NEC tracks. As the Chesapeake Connector is located along the NEC, upgrades are expected for the corridor and are mentioned in Amtrak's NEC Infrastructure Master Plan. The section of the corridor including the Chesapeake Connector is shown in Exhibit 5 below, between Prince and Bacon Interlockings. The red color for one of the proposed track indicates a short-term project, while the green for the switches and fourth track is a long-term project.

Exhibit 5: Amtrak Track Improvements between Baltimore, MD and Newark, DE



Source: Amtrak NEC Master Plan, 2010

In September 2010, Amtrak published a report on the HSR plan for the NEC. Due to the geometric constraints of HSR for curve radii and the safety of dedicated tracks, Amtrak's HSR plan will build two new tracks (one in each direction) which will be for HSR only. For roughly half of the analyzed alignment, as seen in Exhibit 6, the HSR tracks will run parallel to the existing NEC, but the HSR tracks will not be used for freight or other commuter rail services. In that regard, the HSR plan does not duplicate the expansion plan for the Chesapeake Connector's third rail. Depending on the alignment chosen for HSR, there is the potential for interference between the Chesapeake Connector and HSR, though the Chesapeake Connector would likely be completed before the HSR segment's anticipated 2030 completion, which would force Amtrak to alter the HSR route, if needed.

Exhibit 6: Amtrak HSR Route Alignment in Maryland

Source: Amtrak, A Vision for High-Speed Rail in the Northeast Corridor

Chapter 3: Project Alternatives and Cost

This chapter describes the process followed, and logic for development of an engineer's estimate for the Chesapeake Connector Project. The memorandum defines the work items, and what work they encompass. It also attempts to identify unknown elements and explain how those costs were captured in the estimate. The estimate is based a conceptual level, approximately 5%, engineering design. It is recommended that this estimate not be used for application for funds, but instead as starting point for the next level of design. Costs included herein, which were identified as not having a high level of accuracy should be researched first during the next level of design.

The cost estimate was based on existing resources available at the time that the conceptual level engineering task was performed. Data used to develop the estimate included aerial photos, Amtrak track chart data, which included mileage, and location of overhead and under grade bridges, field reconnaissance which was limited to viewing the right of way at public areas, off of Amtrak right of way, and commercially available video footage taken from the head end of an Amtrak train in 1986. Unit prices used in the estimate are based on previous project experience, and off-line discussion with contractors, railroads and agencies, and fabricators, as well as industry recognized estimating tools such as RS Means.

An engineer's cost estimate was developed for each option progressed. These include Option A, and Option B. Option A adds the third main track and crosses the North East Corridor (NEC) tracks 2 and 3 by grade separated structure, in that the third track crosses over the NEC. **The conceptual cost estimate for Option A is $349.5 million.** Option B adds the third main track and crosses the NEC at grade, via use of special track work at Bacon and Prince interlockings. **The conceptual cost estimate for Option B is $162.2 million**. The large difference in cost for the two options reflects the difficulty in raising the grade of Track F to create an overpass to bridge the NEC.

The estimate was organized in the Federal Transit Administration (FTA) Standard Cost Category (SCC) system, in a modified version. While this project will probably not fall within the FTA's jurisdiction, the FTA SCC system was used as it provides an established organization for work elements. An attempt was made to capture as many costs as possible; however, with the limited availability of existing information, the cost estimate does include inaccuracies. Items which are known to include inaccuracies are labeled in the table using the word "ALLOWANCE". ALLOWANCE, indicates an item which is identified as potentially requiring work, but it is unknown what level of work is required. For these items, engineering best guesses were used to determine the unit cost.

The cost estimate contains two levels of contingency; Allocated, and Unallocated. Both forms of contingency are defined in forms of a percentage applied to a cost. Allocated contingency is added to each individual work item. This allows the contingency to be item specific. Items for which it is felt are well understood, and that existing cost data experience is deemed sufficient, are assigned a low contingency percentage. Items which are not fully understood, or which existing cost data experience is not complete or varies widely are assigned a high contingency percentage. For these items, there is a high level of risk involved, and cost could increase greatly, as the level of detailed knowledge increases. Unallocated contingency is added at the final stage of the estimate, as line item 90.1. This contingency adds a percentage to the total sum of all elements, and serves as a project reserve.

The detailed capital cost estimate is presented in Exhibit 7. The category descriptions can be found in Appendix B.

Exhibit 7: Capital Cost Estimate

CHESAPEAKE CONNECTOR FREIGHT AND PASSENGER RAIL BENEFITS STUDY
DATE: 01-10-11 DRAFT
ORDER OF MAGNITUDE CAPITAL COST ESTIMATE
NOTE: COST IN 2011 DOLLARS

SUMMARY TABLE: DRAFT

Cat. No.	Description	OPTION A GRADE SEPARATED OPTION TOTAL COST INCLUDING ALLOCATED AND UNALLOCATED CONTINGENCY: 2011 Dollars	OPTION B AT GRADE OPTION TOTAL COST INCLUDING ALLOCATED AND UNALLOCATED CONTINGENCY: 2011 Dollars
10	GUIDEWAY & TRACK ELEMENTS		
	TOTAL CATEGORY 10	$167,257,175	$49,885,500
20	STATIONS, STOPS, TERMINALS, INTERMODAL		
	TOTAL CATEGORY 20	$0	$0
30	SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS		
	TOTAL CATEGORY 30	$0	$0
40	SITEWORK & SPECIAL CONDITIONS		
	TOTAL CATEGORY 40	$33,032,574	$29,582,574
50	SYSTEMS		
	TOTAL CATEGORY 50	$24,828,636	$23,981,136
	CONSTRUCTION SUBTOTAL (Sum Categories 10 - 50)	$225,118,385	$103,449,210
60	ROW, LAND, EXISTING IMPROVEMENTS		
	TOTAL CATEGORY 60	$7,950,000	$5,460,000
70	VEHICLES		
	TOTAL CATEGORY 70	$0	$0
80	PROFESSIONAL SERVICES (Calc. on Subtotal 10 - 50)		
	TOTAL CATEGORY 80	$78,443,359	$36,267,665
90	UNALLOCATED CONTINGENCY (Calculated on Subtotal Cat. 10 - 80)		
	TOTAL CATEGORY 90	$37,955,514	$17,023,614
	Total Project	$349,467,258	$162,200,489
	Total Route Miles	6.34	6.34
	Cost Per Mile	$55,080,213	$25,564,734

Chapter 4: Freight and Passenger Rail Context

The goal of this task of the *Chesapeake Connector Study* is to quantify the passenger and freight opportunities that would result from construction of additional track capacity on a section of the Northeast Corridor (NEC) between Prince and Bacon interlockings in Cecil County, MD, a distance of approximately 6.3 miles. This section is currently two tracks while most of the North East Corridor (NEC) is three or four track railroad.

Adding additional track capacity through the "Chesapeake Connector" project has the potential of improving both passenger and freight train movements in the area and listed in Amtrak's NEC Master Plan as a priority project as well the Maryland Area Regional Commuter (MARC) Growth and Investment Plan.[1] Freight benefits from the Connector are particularly of interest since Norfolk Southern (NS) trains need to cross the NEC at this section of track to serve the Delmarva Peninsula. These trains can only operate within a restricted time frame between 10:00 PM until 6:00 AM,[2] with trains coming from the west forced to layover on the Port Road rail line. These delays have impacts to the Port of Wilmington, rail service to the Delmarva Peninsula, and create bottlenecks that can affect trains destined for the Port of Baltimore.

Potential Passenger Rail Benefits

SEPTA, MARC and Amtrak operate passenger rail service through or in the vicinity of the corridor. Recognizing that BRAC realignment initiatives are increasing the employment base at the Aberdeen Proving Grounds and that this section of the corridor was one of the few remaining areas not served by rail transit, the study team investigated whether implementation of the Chesapeake Connector could generate benefits through its support of passenger operations in the corridor. The conclusion was that although its implementation would be useful to operations, that there were no scenarios that relied on implementation to generate the benefits. Put another way, there were no scenarios where the benefits would not be generated but for implementation of the Connector.

Amtrak. Amtrak operation currently have precedence in the corridor, therefore operations are not affected by the bottleneck. While the project is included in Amtrak's Master Plan, it is not required to meet

[1] For the purpose of this Study, two track configurations were considered in adding track capacity to this section: third track expansion between Prince and Bacon, and grade separation at the Perry interlocking in Perryville

[2] Interviews conducted during this Study reveals that some NS trains are allowed to cross NEC during the day on an ad-hoc basis depending on Amtrak operating schedules.

the operator's projected growth in regional intercity trains. In addition, while Amtrak is planning for eventual implementation of high-speed rail in the corridor 1) current plans call for the construction of an entirely new track and 2) there is no committed timetable for high-speed implementation at this time—therefore its operation cannot be assumed in estimating benefits from the Chesapeake Connector investment.

MARC/SEPTA. Stakeholders raised the potential to extend MARC service to connect with SEPTA service, coordinating schedules to provide rail service from the region to the Philadelphia market. Investigation of this potential service suggested that corridor capacity was not the limiting factor in adding trains; rather interviews with MTA/MARC staff suggested that operational constraints limited the feasibility of such an approach. Again, while implementation of the Connector would ease movements in the corridor, it was not the limiting factor in the transit scenario—there were no scenarios where it was determined that but for implementation of the Chesapeake Connector, this service could not happen. Therefore, the benefit cost analysis does not estimate passenger related benefits.

Potential Freight Rail Benefits

As part of examining freight opportunities from the Connector, IHS Global Insight (IGI) was asked to review current freight activity in the Connector's study area and assist in identifying freight benefits in terms of additional rail carload traffic or new market opportunities. The results of this work will be used as input to the "benefits" portion of the cost/benefit analysis that will be conducted as part of the study to support the need, funding, and timing of specific physical improvements.

As part of the freight analysis for this study, IGI performed the following tasks using a combination of its TRANSEARCH freight database, forecasting services, NS traffic data, and freight stakeholder interviews:

- Provided an overview of current truck freight traffic in the study area;
- Reviewed current rail traffic using carload statistics provided by the NS and Maryland and Delaware (MDDE) railroads;
- Provided freight forecasts of key commodities the study area; and
- Summarized specific freight opportunities identified by stakeholders that could result from improved freight operations caused by construction of the Connector.

When examining freight for the Chesapeake Connector study, the study area is significantly larger than the 6.3 mile two-track segment between Prince and Bacon since freight operations in this section affect NS train movements to the Ports of Baltimore and Wilmington as well as the Delmarva Peninsula. As a result, IGI

reviewed freight in a nine county area as follows (see Exhibit 8):

- Delaware: Kent, Sussex, and New Castle counties; and
- Maryland: Kent, Queen Anne, Caroline, Wicomico, Worchester, and Dorchester counties.

Exhibit 8: Rail Lines in the Chesapeake Connector Study Area

Source: IHS Global Insight

This study area contains three railroads (see Exhibit 9):

- **Norfolk Southern Railroad (NS)**: NS operates approximately 158 route miles in Delaware consisting of three "secondary" branches:

1. The Shellpot Secondary and New Castle Secondary tracks extends 17 miles from the NEC to Wilmington and Porter. The Shellpot Secondary runs from the NEC (West Yard) to the Port of Wilmington and back to the NEC near Edgemoor. The New Castle Secondary runs from the Shellpot Secondary near the Port down to the Delmarva Secondary. They services industries in New Castle County, including the Port of Wilmington;

2. The Delmarva Secondary traverses 89 miles downstate from the Newark Yard to Seaford, through Porter, Dover, and Harrington, continuing into Maryland at Delmar to Pocomoke City, MD; and

3. The Indian River Secondary is 39 miles in length, branching off the Delmarva Secondary at Harrington and connecting to Frankford via Ellendale, Georgetown to Snow Hill, and serving the Indian River power generating station near Millsboro.

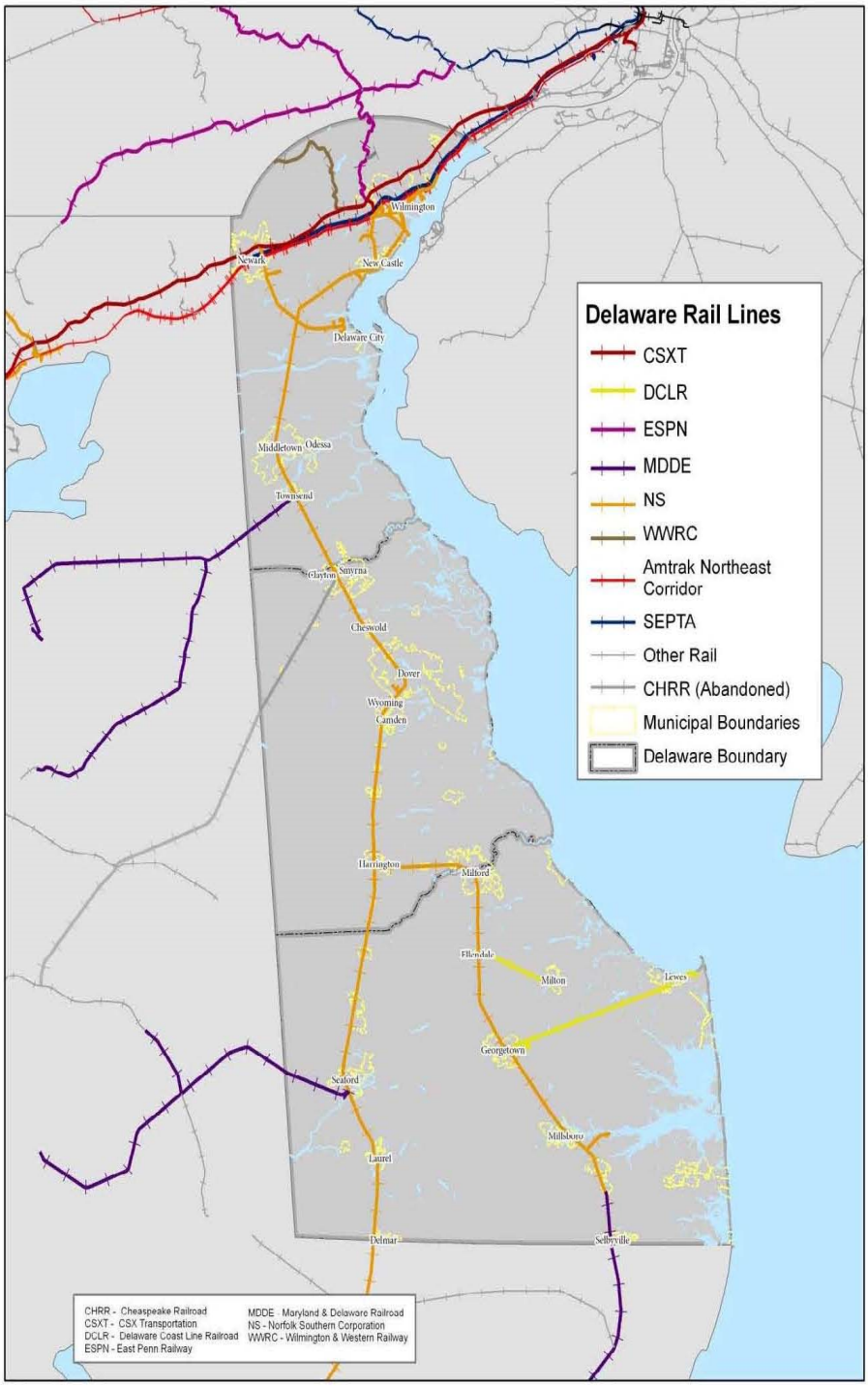
- **Maryland & Delaware Railroad (MDDE)**: MDDE is a short line railroad operating on the Delmarva Peninsula and headquartered in Federalsburg, MD. It operates over 120 miles of track in Maryland and Delaware, 16 of which is in Delaware. MDDE interchanges with NS at Townsend, Seaford, and Frankford.

- **Delaware Coastline Railroad (DCLR)**: DCLR is a short line railroad contracted by the State of Delaware to operate on State-owned track between Georgetown and Lewis. It operates on 23 miles of track in Sussex County and interchanges with NS in Georgetown and Ellendale[3].

In addition, rail freight traffic at the Port of Baltimore was also reviewed through stakeholder interviews.

[3] DCLR was not interviewed as part of the freight analysis for the study. It carries less than 700 carloads annually with little impact expected from construction of the Connector.

Exhibit 9: Rail Lines in the Chesapeake Connector Study Area



Source: Delaware State Rail Plan, April 2011

Truck Freight in the Chesapeake Connector Study Area

IGI used its 2010 TRANSESRCH data base to review truck freight flows in the Chesapeake Connector study area. TRANSEARCH is a database of U.S. county-level freight movements encompassing more than 340 commodity groups and seven modes of transportation. The database combines primary shipment data obtained from some of the nation's largest freight carriers with information from public and proprietary sources to generate estimates of freight flows at the U.S. county level. Once the base year is completed, a separate model is used to produce forecasts to 2030 of those flows using IGI's U.S. Regional Services forecasts (described later in this section).

Exhibits 10 and 11 summarize truck freight traffic in the Chesapeake Connector study area that originates, terminates, or is local in the study area. Through freight was excluded from this analysis because of the large volumes of this traffic that travels on I-95 in the study area that is not relevant to the study.

Approximately 52 million tons of track traffic originated, terminated, or was local in the study area in 2010. Half of this was terminating traffic, making the study area primarily a receiver of truck freight. However, by units, originating and terminating traffic is more evenly divided, implying that inbound truck freight to the area is heavier that outbound freight. Dominant truck commodities are secondary traffic[4], nonmetallic minerals, farm products, food/kindred products, petroleum/coal, and chemicals. Together, these commodities constitute 80% of the truck traffic in the area.

Exhibit 10: Truck Traffic in the Chesapeake Connector Study Area by Direction

Direction	Tons (Thousands)	Percent tons	Units	Percent Units
Inbound	26,114,835	50.3%	2,044,087	43.3%
Outbound	20,091,470	38.7%	1,945,008	41.2%
Local	5,680,984	10.9%	736,289	15.6%
Total	**51,887,290**	**100.0%**	**4,725,384**	**100.0%**

Source: IGI TRANSEARCH 2010

[4] "Secondary" truck traffic in TRANSEARCH includes truck movements involved in local distribution, including traffic to/from warehouses for local delivery, drayage, and movements between warehouses and distribution centers.

Exhibit 11: Major Truck Commodities (in tons) in the Chesapeake Connector Study Area

Secondary Traffic	10,567,286	20.4%
Nonmetallic Minerals	9,969,939	19.2%
Farm Products	6,688,662	12.9%
Food or Kindred Products	6,006,967	11.6%
Petroleum or Coal Products	4,591,028	8.8%
Chemicals or Allied Products	4,010,393	7.7%
All Other	10,053,016	19.4%
Total	51,887,290	

Source: IGI TRANSEARCH 2010

A depiction of the area's truck flows is shown in Exhibit 13. Most of this truck activity stays within the Northeastern United States, moving primarily between Dover, DE; Wilmington, DE; New York City, NY; Salisbury, MD; and Washington, D.C. The short-haul nature of this traffic implies that rail opportunities that may result from construction of the Chesapeake Connector are limited. Rail movements are traditionally longer hauls (i.e. greater than 500 miles) and carry heavier "bulk" products that move more economically in large quantities by rail. While many current truck movements in the area are bulk products suitable for rail (Exhibit 11), their shorter length-of-haul makes conversion to rail unlikely. Moreover, bulk commodities are generally not time or service sensitive and may not divert because of improved rail service from the Connector.

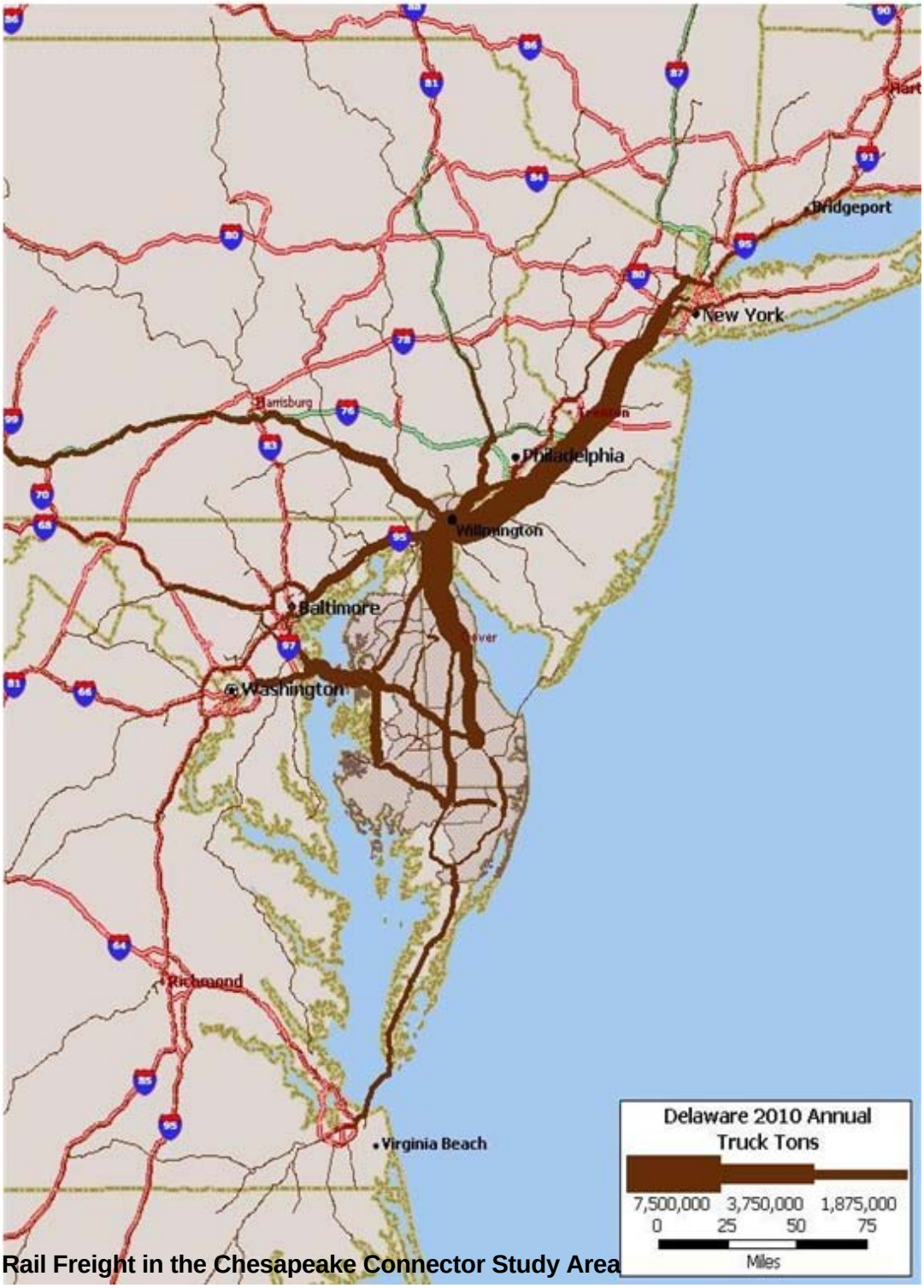
An overview of the length-of-haul characteristics of the area's truck traffic is shown in Exhibit 12. Only 8% of total truck traffic in the study area has a haul greater than 500 miles, which represents a small market of divertible opportunity from truck to rail. More detail on these truck flows would be needed to better understand their potential to shift to rail from construction of the Connector.

Exhibit 12: Potential Rail Divertible Truck Traffic in the Chesapeake Connector Study Area

Length of Haul	Tons (Thousands)	Percent tons
< 500 Miles	47,663,404	91.86%
> 500 Miles	4,223886	8.14%
Total	**51,887,290**	**100.0%**

Source: IGI TRANSEARCH 2010

Exhibit 13: Truck Flows In, Out, and Local to the Chesapeake Connector Study Area



Rail Freight in the Chesapeake Connector Study Area

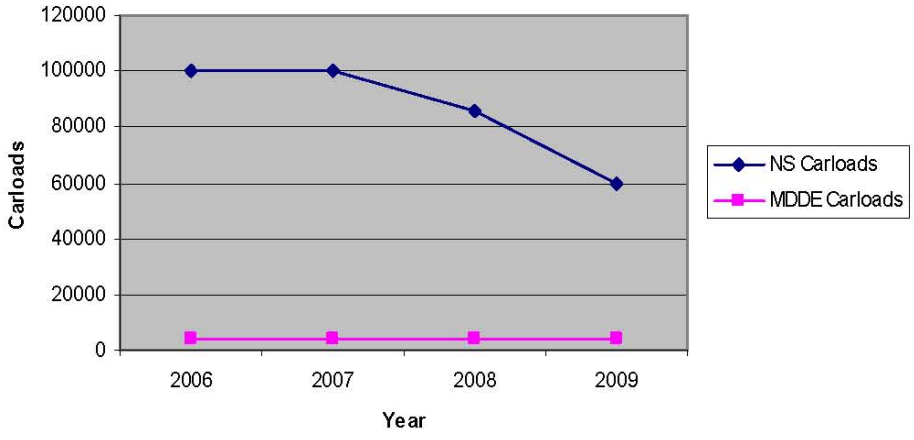
IGI used rail carload data obtained from interviews with NS and MDDE staff to review rail traffic in the study area. These interviews included the following:

- Rick Crawford, General Assistant - Public Projects, Government Relations, Norfolk Southern
- Laura Hoag, Business Units Assistant General Manager, Norfolk Southern
- Richard "Drew" A. Marrs, Government Relations, Norfolk Southern
- C. Scott Muir, Assistant Vice President, Government Relations, Norfolk Southern
- Eric Callaway, President - Maryland and Delaware Railroad

Rail data supplied from these interviews is more aggregated than IGI's TRANSEARCH truck data but demonstrates the current base level of rail traffic that could be affected by the Connector. Exhibit 14 shows Norfolk Southern and Maryland and Delaware (MDDE) carloads in the study area from 2006 to 2009[5].

NS rail traffic dropped 40% during this period from 100,050 carloads in 2006 to approximately 60,000 units in 2009, a significant decrease primarily caused by the economic downturn during this time period. MDDE traffic held steady at approximately 4,000 carloads annually. NS expects its traffic will return to pre-recession levels but 2010 and 2011 carload data was not available from the carrier to confirm this upturn.

Exhibit 14: Norfolk Southern and MDDE Carloads in the Chesapeake Connector Study Area



[5] NS was not able to supply more recent carload data of its operation in the study area.

Based on data obtained during interviews, a more detailed breakdown of NS carload data by its "secondary"

lines (described above) can be estimated. Exhibit 15 presents estimates of 2009 NS carloads on each of its secondary lines[6]. Half of the NS traffic in the area moves on the Wilmington secondary, primarily steel (Claymont Steel), chemicals (Delaware City), and autos at the Port of Wilmington. Much of this traffic is higher-value freight that typically is very sensitive to changes in rail service levels.

NS traffic south of the Wilmington secondary is primarily agricultural (Delmar secondary) and coal (Indian River secondary). The "bulk" nature of traffic south of Wilmington indicates there is little opportunity for new business from potential service improvements from the Connector (interviews with MDDE confirmed this assessment).

Of the approximately 31,000 annual carloads moving south of Wilmington, 13% (4,092 carloads) are interchanged with MDDE.

Exhibit 15: Norfolk Southern Carloads by "Secondary" Rail Lines in the Chesapeake Connector Study Area

NS Secondary	Carloads	%	Major Commodities	Major Customers
New Castle	28,934	48%	Steel, Chemicals, Autos, Aggregates	Port of Wilmington, Rocla Concrete Ties, PBF Delaware City, Claymont Steel, Delmarva Power
Delmarva	11,844	20%	Corn, Fertilizer	MDDE, Perdue, Kraft, Southern States Cooperative
Indian River	19,222	32%	Coal, Aggregates	DCLR, NRG Energy
Total	**60,000**	**100%**		

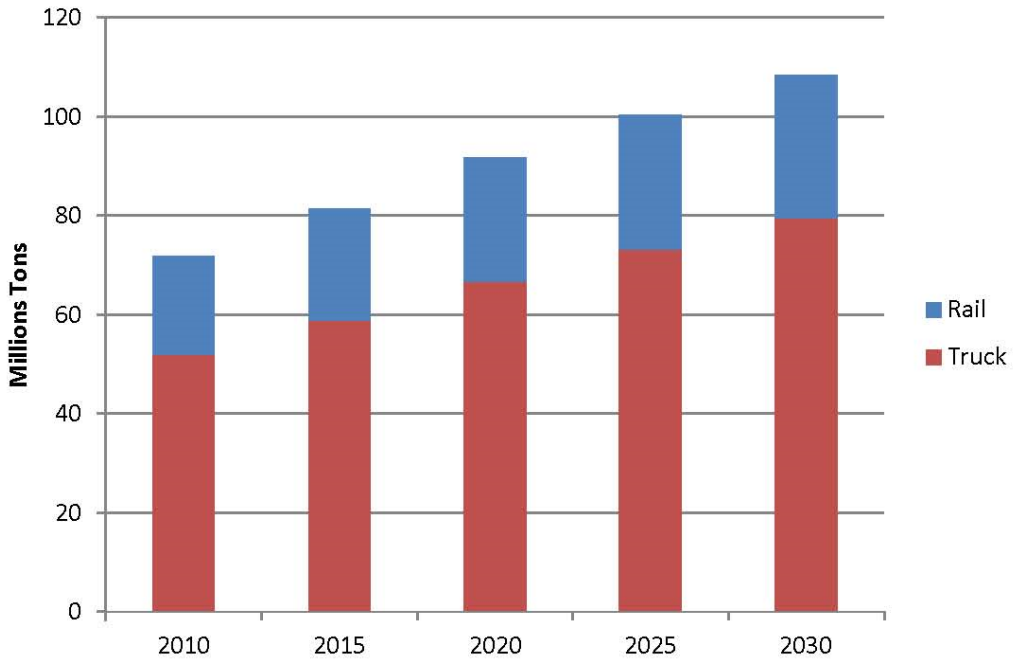
Freight Forecasts in the Study Area

Using IGI's TRANSEARCH database and its U.S. Regional Services, forecasts to 2030 of specific rail and truck commodities in the study area can be estimated. IGI's U.S. Regional Service provides in-depth forecasts and analyses of every U.S. state using a large repository of local data, specific models of State economies, and a multi-disciplinary team of experienced analysts and state economists. State and local

forecasts and analysis from the Regional Service are updated monthly and feed the TRANSEARCH freight forecasts presented in this analysis for the study area. These forecasts can provide insight into the growth prospects of commodities that may be impacted by service changes from the Connector.

A summary of freight forecasts in the study area are shown in Exhibits 16, 17, and 18. Overall freight in the area is expected to grow 2.1% annually (Exhibit 16), slightly lower than U.S. GDP growth projected by IGI for the period. This is due to lower than average agricultural product growth in area as well as declining coal shipments. Rail traffic in the area is expected to grow approximately 1.9 % annually to 2030 and truck traffic 2.2 %.

Exhibit 16: Freight Forecasts in the Chesapeake Connector Study Area by Mode



[6] NS supplied total 2009 carloads and 2008 carloads by secondary lines. 2009 carloads by secondary lines were estimated using similar allocations as the actual 2008 data.

Exhibits 17 and 18 present IGI's forecast of major rail and truck commodities in the study area to 2030. Primary rail commodities in the area include food/kindred products, chemicals, non-metallic minerals, coal, and waste/scrap. Of these, coal shipments are projected to remain flat with the fastest annual growth (3.8%) foreseen in waste/scrap products, including scrap metal and recycled paper. Primary truck commodities in the area include secondary traffic, non-metallic minerals, food/kindred products, and farm

products. Growth in truck traffic will largely be in secondary traffic (3.1% annual growth), shipments that are not prone to be diverted to rail from service changes that could occur due to the Connector.

Exhibit 17: Freight Forecasts in the Chesapeake Connector Study Area by Major Rail Commodities

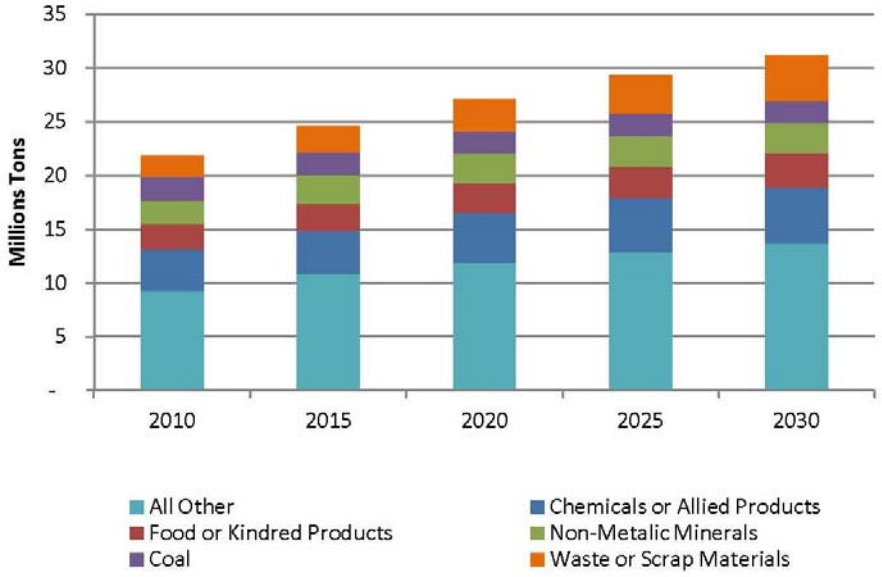
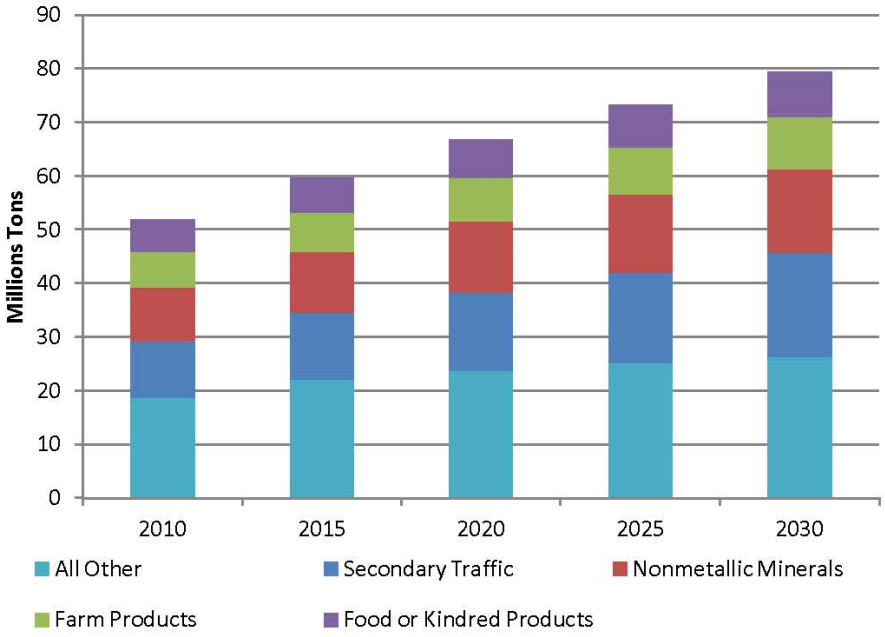


Exhibit 18: Freight Forecasts in the Chesapeake Connector Study Area by Major Truck Commodities



Specific Freight Opportunities in the Study Area

In discussion with rail stakeholders during the study, a number of specific opportunities were identified that had potential to generate additional rail traffic due to more reliable rail service from the Chesapeake Connector. Estimating the short-term and long-term value of these opportunities would be inputs into the cost-benefit analysis that is part of the study to support the Connector. Rail opportunities mentioned during the study include:

- ***Port of Wilmington - New Castle, DE***: Rail capacity is being added at AutoPort, Inc. as part of a public-private partnership project with the Port of Wilmington to handle more automobiles for export and serve increased business in the Northeast. Sidings will be constructed at AutoPort and NS will increase capacity from 60 to 90 railcars. Connections to NS mainline track will be improved to eliminate the conflict with highway traffic at Terminal Avenue. NS will fund 70% of the cost and FHWA 30% of the total estimated cost of $3.3 million. Port officials also indicated potential for shipments of wind and solar energy components from the Port.

- ***Claymont Steel - Claymont, DE***: Predicts 20-30% increase in business from its facility, much of it moving by rail. *(Note: Claymont Steel closed its facility and ceased operations in 2013. The future of the site has not been determined.)*

- ***Delaware City PBF Refinery - Reybold, DE:*** This is the former Valero plant and is currently below capacity. Inbound and outbound carloads could grow as the plant increases production. *(Note: the PBF Refinery began receiving rail car shipments of crude oil from the Western United states via Norfolk Southern trains in 2012. PBF is now receiving three trains per day, totaling approximately 145,000 barrels of oil. That number is expected to grow to 210,000 barrels by December of 2014.)*

- ***Port of Baltimore - Baltimore, MD***: Stakeholder interviews indicated that traffic at the Port could be increased with more consistent train service due to the Connector. However, discussions with Port personnel indicated that current service levels were sufficient to handle future business opportunities.

- ***Mountaire Farms - Frankford, DE***: This customer has indicated it may increase in chicken shipments in the future.

- ***Pennsy Supply - Delmar, DE***: Increases in aggregates and asphalt shipments between Delmar and Harrisburg, PA are expected.

- ***Haines and Kibblehouse - Millsboro, DE***: This aggregate shipper has indicated it may increase its rail volumes.

- ***Kraft Products - Dover, DE***: Potential to divert some truck shipments to rail.
- ***PPG - Cheswold, DE:*** Potential to divert some truck shipments to rail
- ***Delstar Technologies - Middletown, DE***: - Potential growth in thermoplastics business and rail shipments.
- ***Maryland and Delaware Railroad - Federalsburg, MD***: Interviews with MDDE revealed potential for local aggregates shipments within the study area but no new business as a result of improved rail service from the Connector.

NS staff estimated that, in total, there was potential for a 20% increase in carloads from the above opportunities. Based on 2009 traffic levels of 60,000 carloads in the study area, this represents 12,000 cars of new business. At average NS general merchandise revenue of $2,200 per car, approximately $12 million in additional revenue could accrue to NS if all these opportunities were realized.[7] However, more specific estimates of new carload traffic at each of the above firms would be needed in order to calculate benefits consistent with a cost benefit analysis for the study. This type of specific information was not available from NS, the Port of Wilmington, or economic development stakeholders in the study area. As a result, calculation of specific benefits that would result from the Connector was not available.

Conclusions

The Chesapeake Connector has the potential to significantly improve rail freight operations in the Delmarva Peninsula as well for the Ports of Baltimore and Wilmington. To calculate the freight benefits from the Connector as part of an economic cost-benefit analysis, new business in the form of additional carloads or new market sizing needs to be identified as part of the freight analysis of this Study. While many possible new business opportunities were mentioned, stakeholders could not identify specific freight traffic that was threatened or could be generated as a result of service improvements from the Connector. In addition, IGI forecasts of freight traffic shows average or below-average growth in the major truck and rail commodities moving in the study area. From this analysis, it is difficult to use freight improvements as the major rationale to support construction of the Chesapeake Connector.

[7] From 2010 NS Annual Report on general merchandise (non-intermodal) traffic. The report showed 2011 general merchandise revenue of 5.001 (in millions) and carloads of 2280.3 (in thousands), yielding an average of $2,193 revenue per carload

Chapter 5: Benefit Cost Analysis

The Chesapeake Connector project would create far-reaching benefits for the region. To help evaluate which alternative would provide the most long-term benefits, a Benefit-Cost Analysis (BCA) was conducted and presented in this chapter. The purpose of the BCA is to compare the alternatives quantitatively in terms of the individual project costs and the associated benefits. The results of the BCAs in conjunction with budgetary constraints and other qualitative factors will help decision makers select which alternative, if any, is the most feasible.

When conducting a BCA, the result is a ratio that indicates the level of benefits that the project creates compared to the cost of constructing and operating the investment. Typically, a BCA ratio of 1.0 says that the benefits and costs are equal over the analysis period, and a BCA ratio over 1.0 shows that there are more quantifiable benefits than costs for the project. Alternately, a BCA ratio of less than 1.0 may indicate that there are not enough benefits to outweigh the costs, or that the benefits are not quantifiable. The qualitative benefits should also be considered when comparing project alternatives.

The costs and benefits are applied over 20- and 30-year analysis periods in this analysis. The costs and benefits are discounted annually at a 3 and 7 percent discount rate, per DOT guidance. The discount rates represent the interest rate the money could otherwise earn if it were invested instead of used for the project construction and operation. The 3 percent rate is a likely interest rate that could be earned at this time; the 7 percent rate is a more severe threshold for receiving federal money. For this reason, the results at 3 percent are always higher than the results at the 7 percent discount rate.

The balance of this chapter describes the methods used to develop the BCA. It also presents the estimated value of the long term benefits generated by the investments and any related considerations and caveats.

Note: After the data collection and analysis of this study had been completed, NS began shipping crude oil to PBF Refinery in Delaware City via rail transit on this network, significantly increasing the volume (and economic value) traversing this already congested route. The new train trips have NOT been included in this analysis.

Costs

There are two aspects of costs calculated in a BCA: construction costs and the operations and maintenance (O&M) costs. Specifics of each cost are covered in the individual alternative descriptions.

Construction Costs

Construction costs and the construction schedule are used to allot the appropriate costs annually and are then discounted to present value. Construction is expected to begin in 2015 for both alternatives and end in 2018 for Option A and 2017 for Option B. The total construction costs for Option A are more than double the construction costs of Option B because Option A includes a long-span elevated track segment.

Operations and Maintenance Costs

The operations and maintenance (O&M) costs represent the marginal cost to operate and maintain each alternative. The cost of operating and maintaining the new facility is estimated over the analysis periods and then discounted to present value. These values are an estimate of the cost of annual infrastructure maintenance. Using maintenance costs from the Amtrak NEC Master Plan, a cost of $400,000 per route- mile of track per year was used. The alternatives are equal lengths (6.34 miles) so their O&M costs are equal.

Benefits

The benefits of the alternatives include train operating savings, safety, emissions, pavement, inventory savings, congestion, and the residual value. The benefits are accrued over the analysis periods and discounted to the present value.

Train Operating Savings

The annual value of train operating delay savings is a recurring benefit for the railroads. The components of the delay cost can be calculated by summing four elements: unproductive locomotive costs; idling fuel costs; car/equipment costs; and crew costs. However, it is important to note that this method underestimates the true value as it does not capture the cost to the railroad of the interruption to its schedule and the impact that the delay has on other parts of its operating network. This approach also excludes costs to shippers from having their deliveries delayed and the costs to railroads of crew changes due to delays that conflict with labor laws. The values presented here are a means of providing a firm lower bound on the cost of the current delays experienced in the corridor.

By improving the rail access along the corridor through adding the additional track and removing the delay associated with the bottlenecks, significant time savings are realized. Estimating that eight trains are delayed for two hours four times each week amounts to 3,328 total hours of train delays annually. A recent estimate by one Class 1 railroad is that train delay costs approximately $261 per train-hour

(2008$)[8 9] or approximately $274 (2012$)[10]. The resulting annual cost of train operating delay equates to over $900,000 for both alternatives.

[8] Lai, Y.C. Increasing Railway Efficiency and Capacity through Improved Operations, Control and Planning, Ph.D. Dissertation, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, 2008, as cited in Dingler, Mark and Y-C (Rex) Lai and Christopher P.L. Barkan. TRB Paper 09-2652, "Impact of Operating Heterogeneity on Railway Capacity," 2009.

Safety Savings

By providing additional rail capacity to the region, fewer goods will rely on trucking and will instead be shipped by rail, reducing truck drayage. This reduced drayage will result in a reduction in annual truck vehicle miles traveled (VMT) of 1.56 million miles. This reduces the rate or likelihood of crashes and associated deaths, injuries and property damage on regional interstates and highways because fewer trucks will be traveling on local roads and highways. To convert the annual truck VMT avoided into crashes avoided, the following crash rates from the Bureau of Transportation Statistics (BTS) were applied.

Exhibit 19: BTS Accident Rates per 100,000,000 VMT, 2009

Fatalities	1.144675318	per 100,000,000 VMT
Injured persons	75.06345185	per 100,000,000 VMT
Crashes	186.3889501	per 100,000,000 VMT

Source: 2009 BTS Motor Vehicle Safety Data Table 2-17 (from 2011 National Transportation Statistics)

http://www.bts.gov/publications/national_transportation_statistics/#chapter_2

These crash reduction factors were then converted to the Maximum Abbreviated Injury Scale (MAIS) accident types in order to apply US DOT Guidance on the value of avoiding an accident. The conversion is based on the NHTSA KABCO-AIS Conversion Table (July 2011) provided on page 12 of the TIGER 2012 Benefit-Cost Analysis Resource Guide for Injury (severity unknown) and No Injury accidents[11].

Exhibit 20: Annual Projected Crashes Avoided by MAIS Crash Type

Fatalities	0.0096
MAIS 5	0.0066
MAIS 4	0.0028
MAIS 3	0.0245
MAIS 2	0.0687
MAIS 1	0.5091
PDO	1.5846

[9] This value is also very similar to the value applied in the successful TOWER 55 TIGER application, p. 42, line 63,

http://www.tradecorridors.com/tower55/pdf/Appendix%20A%20-%20CBA.pdf. This cost is conservative as it assumes only one locomotive.

[10] Escalated to 2012$ using GDP deflator.

[11] TIGER 2012 Benefit-Cost Analysis Resource Guide for Injury accessible at: http://www.dot.gov/tiger/docs/tiger-12_bca-resourceGuide.pdf

The values shown above are projections of annual fatalities and injuries avoided because the BTS crash types are based on fatalities, injuries, and damage per 100,000,000 VMT, which takes into consideration vehicle occupancy. Based on the number of fatalities, injuries, and property damage incidents, their total annual value is found from the US DOT Guidance and the National Highway Safety Council estimates for the value of avoiding an accident. The estimates applied in this analysis are summarized in Exhibit 21 below.

Exhibit 21: Value of One Person Avoiding a Crash, Millions of 2012$

Crash Type	Value of Avoiding Crash	Source
Value of Statistical Life (VSL)	$6.286	Based on 2011 OST Guidance
MAIS 5 Critical (0.593) Fraction of VSL	$3.728	Based on 2011 OST Guidance
MAIS 4 Severe (0.266) Fraction of VSL	$1.672	Based on 2011 OST Guidance
MAIS 3 Serious (0.0575) Fraction of VSL	$0.660	Based on 2011 OST Guidance
MAIS 2 Moderate (0.047) Fraction of VSL	$0.295	Based on 2011 OST Guidance
MAIS 1 Minor (0.003) Fraction of VSL	$0.019	Based on 2011 OST Guidance
PDO $3,285 (2010$)	$0.003	NHTSA, Economic Impact of Motor Vehicle Crashes, 2000

Note: Values were escalates to 2012$ using GDP Price Index Deflators

Applying the crash costs in Exhibit 21 to the projections of crash reductions provided in Exhibit 20 and the annual VMT avoided yields the annual safety savings. The annual safety savings are equal in Option A and B.

Emissions Savings

By providing additional rail capacity to the region, the Project reduces the need for freight to be trucked. As a result, the region will experience a reduction in truck VMT—1.56 million miles annually—and the associated air pollutants. The VMT estimate is based on the number of truck trips and the distance through Delaware and the Delmarva and assumes half of the trucks on the routes will be removed.

This reduction in VMT decreases the amount of Carbon Monoxide (CO), Nitrogen Oxides (NOx), Volatile Organic Compounds (VOC), Particulate Matter (PM2.5 and PM10), Sulfur Dioxide (SO2), and Carbon Dioxide (CO2) in the atmosphere. Federal Motor Carrier Safety Administration guidance for the pollutant factors (g/VMT) associated with truck drayage from the Hours of Service Environmental Assessment were applied to the annual VMT reduced[12]. The grams were converted to long tons for CO, NOx, VOC, PM, and SO2 and metric tons for CO2.

The economic benefit of the decreased emissions is estimated by applying the economic cost of air emissions to the reduction of CO, NOx, PM2.5, PM10, SO2, and VOC as recommended in the US DOT TIGER BCA guidance[13] over the analysis periods and discounted at 3 and 7 percent. Alternately, using the Interagency Working Group on Social Cost of Carbon guidance[14], the value of carbon dioxide benefits are discounted at 3 percent. The annual emissions savings and carbon dioxide are equal in Option A and B.

[12] FMCSA, *Hours of Service (HOS) Environmental Assessment, Appendix A: Analysis of Air Quality Impacts,* Dec 2010.

Pavement Savings

The Project will reduce truck drayage in the region by 12,480 truck trips per year as soon as the project is complete. This reduction in truck trips removes 1.56 million VMT annually from regional interstates and highways, thereby reducing the truck wear and tear on the pavement. The FHWA Highway Cost Allocation Study, 2000 Addendum[15], estimates the marginal pavement costs per VMT to be 18.1 cents (in 2000$) or 19.5 cents (2012$)[16] for a 60 kip 4-axle US Truck on an Urban Interstate. Multiplying the avoided VMT by the costs per mile results in the annual avoided pavement costs over the analysis periods. The annual savings are equal for Option A and B.

Inventory Savings

Removing the rail delay currently experienced in the corridor also yields an inventory savings for shippers as they are able to deliver these goods more quickly. The inventory savings associated with the Project is proxied by the opportunity cost of holding assets in inventory rather than using them for another purpose. As a result, it is based on the annual value of the goods shipped by intermodal train daily, annual hours of delay avoided, and an hourly commercial discount rate. This benefit is only estimated for current and planned trains without the Project, not the additional capacity offered by the Project.

The annual value of goods shipped by train daily is estimated as follows. An estimated value of the goods per car load of $20,000 was assumed, and 8 trains are delayed for 2 hours 4 times per week

resulting in 3,328 annual hours of delay per car. Additionally, the number of cars per train today is 20, resulting in just over 33,000 carloads per year that are delayed. The inventory cost associated with the annual carloads and annual hours of delay is based on the commercial discount rate - the opportunity cost associated with holding assets in inventory rather than using them for another purpose. The analysis uses a commercial discount rate of 4.25%[17]. Assuming 8,760 hours in a year (365 days * 24 hours), this yields an hourly discount rate of 0.00049%. Multiplying this hourly discount rate by the annual number of carloads, the value per carload, and the hours of delay avoided yields the annual value of inventory savings. This analysis only considers the train inventory costs and does not include the savings that companies would realize by not having to maintain higher inventories due to the unreliability of shipments. It also does not include the inventory savings that would be attributed to shippers who lease or own more train cars in order to keep more of them in service as a result of inefficient shipments.

[13] The economic costs of air emissions are taken from Chapter VIII of the Final Regulatory Impact Analysis of the National Highway Traffic Safety Administration's rulemaking on Corporate Average Fuel Economy for MY 2012-2016 Passenger Cars and Light Trucks.

[14] Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, February 2010

[15] FHWA Highway Cost Allocation Study, 2000 Addendum accessible at:

http://www.fhwa.dot.gov/policy/hcas/addendum.htm, Table 13

[16] Escalated to 2012$ using GDP deflator for Capital Non-defense. See Final BCA Port of Oakland.xlsx in the supporting materials for details.

The annual inventory savings are equal for both alternatives.

Congestion Savings

Additionally, the annual VMT avoided reduces the marginal cost of congestion on other vehicles traveling these roads. The FHWA Highway Cost Allocation Study, 2000 Addendum[18] estimates the marginal congestion costs per VMT to be 32.6 cents (in 2000$) or 42.0 cents (2012$)[19] for a 60 kip 4-axle US Truck on an Urban Interstate. Multiplying the VMT avoided by the congestion cost yields annual congestion savings that are equal for both alternatives.

Residual Value

The useful life of the components of the alternatives was estimated according to BEA guidance[20]. The alternatives include assets that will have value or use that extends beyond the 20- or 30-year analysis periods used in this study. In order to estimate the residual value of these assets left at the end of the

analysis period, the capital investments were depreciated (straight-line) over the full life of the assets. The first 20 or 30 years of the series were excluded from the residual estimation (depending on the analysis period); this is the basis of the benefits estimation reported elsewhere. The remaining years of the series were discounted back at 7 and 3 percent rates and summed for each alternative over each analysis period.

[17] The commercial discount rate applied in the analysis falls on the conservative side of the 7% to3% discount rate applied in the TIGER analysis. Additionally, the successful TOWER 55 TIGER application applied the same discount rate for shipping inventory cost. http://www.tradecorridors.com/tower55/pdf/Appendix%20A%20-%20CBA.pdf

[18] FHWA Highway Cost Allocation Study, 2000 Addendum accessible at:

http://www.fhwa.dot.gov/policy/hcas/addendum.htm, Table 13

[19] Escalated to 2012$ using GDP deflator.

[20] Bureau of Economic Analysis Rates of Depreciation, Table C. - Service Lives, Declining-Balance Rates, and Hulten-Wykoff categories. Accessed at: http://www.bea.gov/scb/account_articles/national/wlth2594/tableC.htm

BCA Results

The results of the analysis are presented in Exhibit 22 on the following page, comparing the costs of Option A and B with their associated benefits. The benefits were applied over 20- and 30- year analysis periods at both 3 and 7 percent discount rates.

As mentioned in the benefits sections above, these estimates are conservative and the additional impacts that have not been included could be significant. Option B is clearly preferred over Option A and looks viable even under the 20-year analysis period at the 3 percent discount rate. With the caveats mentioned in the benefits sections above, Option B could be feasible at a 4 percent discount rate.

Exhibit 22 - Benefit Cost Analysis Results

	Discounted at 7%				Discounted at 3%			
	20-Year Horizon		30-Year Horizon		20-Year Horizon		30-Year Horizon	
In Millions $2012	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B
Benefits								
Train Operating Savings	$ 6.43	$ 6.88	$ 7.53	$ 8.06	$ 11.35	$ 11.69	$ 14.96	$ 15.41
Safety	$ 1.85	$ 1.98	$ 2.16	$ 2.32	$ 3.26	$ 3.36	$ 4.30	$ 4.42
Emissions	$ 0.50	$ 1.31	$ 0.56	$ 1.54	$ 0.83	$ 2.23	$ 1.02	$ 2.94
CO2*	$ 0.48	$ 0.49	$ 0.66	$ 0.67	$ 0.48	$ 0.49	$ 0.66	$ 0.67
Pavement	$ 2.15	$ 2.30	$ 2.51	$ 2.69	$ 3.79	$ 3.90	$ 4.99	$ 5.14
Inventory Savings	$ 75.86	$ 81.18	$ 88.86	$ 95.08	$ 133.90	$ 137.92	$ 176.41	$ 181.70
Congestion	$ 4.62	$ 4.95	$ 5.41	$ 5.79	$ 8.16	$ 8.40	$ 10.75	$ 11.07
Residual	$ 9.72	$ 4.78	$ 2.93	$ 1.44	$ 37.19	$ 17.60	$ 14.13	$ 6.69
Total	***$ 101.62***	***$ 103.86***	***$ 110.64***	***$ 117.59***	***$ 198.96***	***$ 185.60***	***$ 227.21***	***$ 228.04***
Costs								
Capital	$ 271.89	$ 127.40	$ 271.89	$ 127.40	$ 315.44	$ 147.04	$ 315.44	$ 147.04
O&M	$ 17.98	$ 19.24	$ 21.06	$ 22.53	$ 31.73	$ 32.68	$ 41.80	$ 43.06
Total	***$ 289.86***	***$ 146.63***	***$ 292.94***	***$ 149.93***	***$ 347.17***	***$ 179.72***	***$ 357.25***	***$ 190.10***
Benefit-Cost Ratio	**0.35**	**0.71**	**0.38**	**0.78**	**0.57**	**1.03**	**0.64**	**1.20**
*Note CO2 is only discounted at 3%								

Both the public and private sectors benefit from construction of the Project, indicating that it is a good project for the overall economy. The train operating savings are realized by Norfolk Southern and the inventory savings are realized by non-railroad private companies. The remaining benefits are attributed to the public sector.

Chapter 6: Findings and Conclusions

Constructing a third track along a 6-mile portion of the NEC between Prince and Bacon Interlockings would alleviate bottlenecks in one of the NEC's few remaining double track sections. The two-track section is a bottleneck in the corridor which results in delays when multiple stakeholders attempt to utilize the limited space. The project to construct a third rail, the Chesapeake Connector, has the potential to benefit multiple public and private beneficiaries and it is a project with a long history of consideration in the region. The project team consulted previous studies, stakeholder interviews, and passenger and freight data in order to analyze whether recent changes in operations and the surrounding economy would increase benefit outcomes relative to past assessments.

The Chesapeake Connector project was evaluated as a standalone project, not as part of a larger package of project such as the Susquehanna Bridge Replacement project. As such the results would be anticipated to increase with the greater traffic anticipated in the corridor with the bridge's greater capacity. The Susquehanna Bridge project was not initiated until this study was nearly completed.

Two alternatives for the third-track alignment were considered: Option A and B. Option A would add a single third main track along the corridor and cross the NEC tracks 2 and 3 by a grade-separated structure over the NEC. Option B would add a third track to the NEC at grade at much lower cost than Option A. Because of the differing views of the necessity of the project, a benefit cost analysis was conducted to consider the costs of the two options and the benefits that each would incur both to the public and private sectors. The BCA found that Option B would provide more benefits at a lower cost, resulting in a BCA of 1.03 over a 20-year analysis period (1.20 over a 30-year period) and with a 3 percent discount rate. The largest beneficiary of the project are shippers in the region, followed by the railroad. The public sector receives a diverse set of smaller benefits.

Industries in the region see the third track as an opportunity to increase production, but many industries in the region were contracting. The contraction may be in part due to the economic recession, but also there is limited outlook for growth. The Delmarva Peninsula is known for a handful of industries, including poultry, shipping cars, aggregate, coal, and warehousing. Freight in the region along the Chesapeake Connector is anticipated to grow at a rate of 2.1% annually through 2030, which is lower than the predicted national GDP growth over that period. While growth is expected to slow, new companies are investigating the area, particularly because Delaware has no inventory tax which is attractive to companies that rely on inventory, and the state is looking at an opportunity to partner with Amazon. Rail service along the Delmarva Peninsula has become less reliable in recent years, but this deterioration

stems from crew shortages and the need to assign labor to more profitable routes than capacity conflicts in the corridor.

The conclusion of this report is consistent with prior studies that concluded that the Chesapeake Connector would ease operations in the corridor but not generate large economic benefits relative to its cost[21]. The difference is that while past studies found the cost prohibitive relative to the benefits, this study finds that recent developments have altered conditions to suggest a small positive return on investment at the lower discount rate. This is not a strong argument for making the investment as the return is low at a favorable discount rate.

This finding is tempered by additional knowledge that there are anticipated benefits that could not be quantified as part of this analysis that would likely raise the return. First, the benefits accruing to the railroad are likely understated in this analysis. While direct savings from avoiding delays are avoided, the impact of these delays on the broader Norfolk Southern network could not be estimated. Because rail service operates as a network, a delay at one point can have a cascading impact on operations on other locations physically connected to the delay point. Second, the benefits to shippers are also understated. The direct inventory costs of the delays are estimated, but the additional costs with holding "buffer" inventories to maintain production despite delays in supply deliveries and the costs of less efficient rail fleet utilization (for those shippers who own or lease their railcars) is omitted from the analysis. While both factors would raise the benefits estimated here, even a 20 percent increase in the estimated benefits (as a proxy for greater reliability for the railroad and shippers) would strengthen but not fundamentally changing the results of the analysis.

Finally, the project's evolution to include it as part of the Susquehanna River Bridge improvements is a positive development as this likely increases the return on investment further, due to potential cost savings as part of a larger project's construction and because of the changes to rail traffic in the region that could alter both the volume and value of freight using the corridor.

Note: After the data collection and analysis of this study had been completed, NS began shipping crude oil to PBF Refinery in Delaware City via rail transit on this network, significantly increasing the volume (and economic value) traversing this already congested route. The new train trips have NOT been included in this analysis.

[21] Track A Extension Feasibility Study, Phase II, Final Report, October 2005, Parsons Brinckerhoff (Document 34).

Appendix A: Summary of Documents to Distribute to the Steering and Technical Committees

Core Documents

Engineering Review

No documents were identified as central to the Chesapeake Connector Study.

Travel Demand Review

Only one document was identified as a core document:

BRAC Transportation Challenges & Opportunities - CSSC Regional Rail Summit, October 20, 2009, WILMAPCO (Document 15)

This is a PowerPoint presentation with maps that show the projected population and employment changes from 2000 to 2030, the distribution of commuter trips into and out of Harford County in 2000, the estimated change in average travel speeds and volume/capacity in 2035 in the region, the increase in truck volumes from 2002 to 2035, the inter-regional and regional commuter rail transit in the region, the rail tonnage growth from 2006 to 2035, and the Maryland Rail project locations. It also includes a short description of the Chesapeake Connector Project and how it relates to the graphs presented.

Freight Review

No documents were identified as central to the Chesapeake Connector Study.

Planning and Policy Review

No documents were identified as central to the Chesapeake Connector Study.

Combined Economic Assessment

Two documents were identified as core documents:

WILMAPCO 2040 Regional Transportation Plan, January 2011, WILMAPCO (Document 40)

This report is an update to the 2030 Plan. It is more concise and discusses changes since the last plan in

the region. It shows that according to a public interest poll, transportation, growth and development, and the economy are the main interests of the public. The "Commuter Rail Gap," a 20-mile stretch of track between Perryville and Newark absent of train service, is perhaps the single most pressing transportation problem in the region. The RTP does not list the penalties or costs of not providing this service. It states that WILMAPCO is partnering with MDOT, DelDOT, Norfolk Southern, and Amtrak, to conduct a study to determine the benefit of adding an extra rail track to this corridor and lists the project in the "Financially Reasonable RTP Projects Short-Term 2011-2015" category.

WILMAPCO 2040 Regional Transportation Plan - Appendix A: Glossary, January 2011, WILMAPCO (Document 41)

This Appendix is a glossary of terms used in the WILMAPCO 2040 Regional Transportation Plan. Most of the words will be familiar to the team and Technical Committee. However, it may be helpful for some members of the Steering Committee that are not familiar with these types of reports.

Supporting Documents

Engineering Review

Four documents were identified as supporting documents, including:

Amtrak Master Plan Rail Schematic, February 5, 2008, Amtrak (Document 1)

Contains two 11x17 sheets, illustrating the NEC between MP 40 (Newark, DE), and PM 70 (Perryman, MD) in schematic format. These appear to be back-up for Document 33, and illustrate the two alternatives for a third track between Bacon and Prince. The sheets show 3 schematics: 1) existing condition, 2) third track tunnel alternative, and 3) third track at grade, on east side alternative.

I-95 Corridor Coalition Mid-Atlantic Rail Operation Study Phase II Final Report, December 2009, Cambridge Systematics (Document 24)

This is the final report for a comprehensive planning study for increasing north-south rail capacity in Mid-Atlantic region—within the states of New Jersey, Pennsylvania, Delaware, Maryland, and Virginia. The study includes work on three railroads: Amtrak, CSXT, and Norfolk Southern. Capacity is plotted at existing (2009) levels, and projected to future (2035) levels.

It identifies 217 projects, of which 110 are identified as capacity projects, and 81 as clearance projects. The total estimated cost to implement all projects is $12 billion, in 2009 dollars. (Note: this seems light given the number of projects, the variety of projects, and the geographical/geopolitical location of the projects).

Full implementation of the program of projects would create a 1.86 benefit-cost ratio. Implementing what are defined as priority projects (approximately 150 projects) would result in a 2.9 benefit-cost ratio due to the deferment of several of the highest-cost and most complex improvement projects.

Document identifies the practical trains per day, classified in terms of number of tracks, signalization control, and mix of train types. Of interest to the Chesapeake Connector Project is that for double track, the practical number of trains per day is 75 based on an AAR National Freight Infrastructure Capacity and Investment Study prepared by Cambridge Systematics in 2007. That number increases to 133 with the addition of a third track. Additionally, the document identifies train count increase estimates for the year 2035. (Note: the numbers seem generous). While not referred to in name, it can be assumed that the Bacon to Prince segment of the NEC is included as a project in this study.

Statement of Work for the Conceptual Design Study for Third Track Alternatives to Amtrak's Northeast Corridor from Perryville to Elkton MD, April 4, 2008, Amtrak Office of the Chief Engineer (Document 33)
Document serves as an RFP for a Concept Study for Third Track, Bacon to Prince. It describes two alternatives: 1) new track to cross under NEC and 2) new track on east side of NEC, between Bacon and Prince.

Track A Extension Feasibility Study, Phase II, Final Report, October 2005, Parsons Brinckerhoff (Document 34)

This report contains information regarding public outreach, ridership forecasting, operational analysis, engineering analysis, and environmental analysis for Phase II of the analysis to extend commuter rail service from Washington and Baltimore to the north. This phase focuses on the 14.5 mile segment between Elkton, MD and Perryville, MD. Three alternatives were examined: 1) stopping a limited number of Amtrak trains at Elkton, similar to the two daily trains that stop in Newark, DE currently, 2) extending the existing level of MARC service at Perryville to Elkton, and 3) extending a more robust service (double the existing service) from Perryville to Elkton.

Travel Demand Review

Five documents were identified as supporting documents, including:

The Northeast Corridor Infrastructure Master Plan, May 2010, NEC Master Plan Working Group (Document 3)

While a majority of the document deals with Amtrak service outside of the study area, there is information in Part II on pages 26, 40, 42, and in Part III on page 17. These include the Amtrak rationale for the third track between the Bacon and Prince Interlockings and the projected number of daily movements in 2030, which are expected to increase from 80 Intercity Passenger Rail (IPR) trains to 110 IPR and from 0 commuter rail trains to 73 between Elkton and Perryville. The rationale for the program of projects that includes the third track is the following:

"The two- and three-track NEC Main Line in northern Maryland will largely be at capacity by 2030. Three bridges in the section, at the Susquehanna, Bush, and Gunpowder rivers are all beyond their useful life. Replacement of all three bridges will also improve operating efficiencies. Potential track upgrades between Perry and Prince interlocking and new track to accommodate improved freight operations as well as expanded passenger service between Iron and Prince, and Grace and Bush interlocking will mitigate future bottlenecks. A new storage facility is needed to accommodate MARC 2030 commuter services in northern Maryland. Upon completion, the bridge and track improvements will create a three- and four-track Main Line through northern Maryland capable of accommodating Amtrak, improved freight and MARC future service plans."

The track improvements are included in the Capital Project Summary by Segment, but the Chesapeake Corridor is included in the Northern Maryland Bridge and Track Expansion Improvements, which includes multiple improvement projects from the fourth track at Iron to Prince Interlockings to the Union Tunnel fourth Track at milepost 414.

Commuter Rail Service Extension from Newark, DE to Elkton, MD Phase 1: Feasibility Study of Track A Extension Final Report, March 2003, Rummel, Klepper, and Kahl (Document 16)

This report was prepared in 2003 for Cecil County, WILMAPCO, and the Maryland Department of Transportation and assesses a range of alternatives to provide direct rail service to the Elkton, MD area. The document identifies existing service in the region and five alternatives, estimates ridership potential for the alternatives, and identifies necessary infrastructure and cost estimates for each alternative. It also identifies

engineering/operational issues and environmental issues associated with each alternative. The demand analysis presented includes the results from a 2002 on-board survey. A distance-based sketch planning model was used for the demand analysis.

MARC Growth and Investment Plan, September 2007, MARC (Document 29)

This presentation discusses the benefits of growth and investment in MARC service, ridership growth trends, existing system capacity issues during the peak period, and major programmed investments.

The *benefits* listed include: provides better service for current riders; addresses existing problems with capacity, frequency and reliability; provides framework for mobility in central Maryland; provides fast, reliable transportation in key corridors; strengthens economic and social ties between Baltimore and Washington; serves BRAC-related travel markets; offers mobility choice for commuters and regional travelers; represents an efficient and environmentally sustainable (air, water, energy) transportation investment; reduces need to expand highways in areas with limited/expensive construction opportunities; encourages efficient regional land use development and transit-oriented development; provides backbone for integrated Baltimore region transit system; and supports more efficient rail freight movement.

The *objectives* for the plan include: increase passenger-carrying capacity threefold; increase share of trips by MARC during peak travel periods; increase peak service to 15-minute headways on Penn Line and 20-minute headways on Camden and Brunswick lines; increase off-peak service to 30-minute headways on Penn Line and increase mid-day service on Camden and Brunswick lines; provide express and limited stop service, late evening service, and weekend service; and improve reliability to 95% on-time or better.

It identifies immediate improvements (9 months) and presents the 2010, 2015, and 2020 plans and capital cost summaries for each of the plan years/periods. It also provides operations and maintenance cost summaries for the plan years and an action plan for implementation (immediate, 9 month, 15 month).

MARC Penn Line Extension Ridership Estimation Update, July 28, 2006, Parsons Brinkerhoff (Document 30)

The document examined two scenarios with updated socio-economic projections: 1) “No Build Scenario,” which assumes MARC Penn Line service will terminate at Perryville with the same existing service levels and fare policies, and 2) “Build” scenario, which includes extending MARC Penn Line service to five additional stations north of Perryville (North East, Elkton, Newark, Churchman’s Crossing, and

Wilmington, DE) and assumes the same existing service levels and fare policies.

Forecasts were developed for 2030 in the update. The No Build estimate for ridership in 2030 for Perryville is 210 riders per day. The updated 2030 extension ridership is 1,057 at the six stations from Perryville to Wilmington. This is a 42% increase over the previous estimates that were based on older demographic data. The forecasts were based on a commuter rail aggregate sketch level model based on the analysis of eight commuter rail providers and approximately 900 stations.

MARC Service Extension to Elkton: Feasibility Analysis, October 2002, Maryland Transit Administration (Document 31)

This document defines in a very preliminary manner the operational issues, infrastructure requirements (including station requirements) potential ridership, and capital costs estimates for extending the Penn Line to Elkton, MD from Perryville. The data contain some historical perspective, freight activity (as of 2002), and include some very preliminary cost estimates.

The paper references a license plate study showing that less than 2 percent of vehicles were from North East or beyond at the Perryville station, whereas the 2005 study showed that a majority of the passengers come from Cecil County, but 43 percent reported Delaware zip codes and another 13 percent reported Pennsylvania zip codes.

Freight Review

No documents were identified as supporting documents.

Planning and Policy Review

No documents were identified as supporting documents.

Combined Economic Assessment

Three documents were identified as supporting documents, including:

State of Good Repair Spend Plan (PRIIA), April 2009, Amtrak (Document 4)

In response to the Passenger Rail Investment and Improvement Act of 2008, Amtrak must develop a capital

spending plan to bring the NEC mainline into a state of good repair by 2018. This is an initial plan that should be superseded by the NEC Infrastructure Plan (Document 3).

Aberdeen Proving Ground BRAC Impacts on Seven Jurisdictions, September 2007, Sage Policy Group, Inc (Document 6)

It is a report prepared in 2007 for the Chesapeake Science and Security Corridor (CSSC) Consortium. The document provides jurisdictional level employment, households, population, and public school enrollment projections for BRAC impacts at Aberdeen Proving Grounds (APG) for 2017. It also demonstrates the total costs of services related to BRAC, the fiscal impacts related to BRAC, and the net fiscal impact of BRAC by jurisdiction.

This paper presents the methodology and assumptions for the study. More detailed examination is required. Dave Gula and Dan Blevins commented that this report has been viewed negatively almost from issuance, and will give us some guidance to potential pit falls to avoid.

WILMAPCO 2040 Regional Transportation Plan - Appendix C: Financial Analysis, January 2011, WILMAPCO (Document 43)

This Appendix is a listing of the methodology and assumptions used in the financial analysis in New Castle County and Cecil County. This includes projections of state revenues, borrowing, operating costs, and capital spending based on historical information. These assumptions will be helpful for the economics team members.

Peripheral Documents

Engineering Review

Three documents were identified as peripheral, including:

I-95 Corridor Coalition Mid-Atlantic Rail Operation Study Phase II Summary Report, Dated December 2009, Cambridge Systematics (Document 25)

This document is a summary of Document 24, which is already identified as a supporting document.

I-95 Corridor Coalition Mid-Atlantic Rail Operation Study Phase I Summary Report, Dated April 2002,

Cambridge Systematics (Document 26)

This document is a summary of Document 28, which is an earlier generation of Document 24; therefore, it was classified as peripheral.

I-95 Corridor Coalition Mid-Atlantic Rail Operation Study Phase I Final Report, Dated June 2007, Cambridge Systematics (Document 28)

This document defines the I-95 corridor, infrastructure improvements required itemized by state, and the long term project plan for implementation. It does not mention the third track between Bacon and Prince, as it is an earlier generation to Document 24; therefore, it was classified as peripheral.

Travel Demand Review

Seven documents were identified as peripheral, including:

APG-BRAC Appendix D1-2015 with BRAC Turning Movements, April 2008, Maryland Department of Transportation, Sate Highway Administration, Regional and Intermodal Planning Division (Document 7)

This document contains 2015 BRAC turning movements prepared in 2008. Specifically, detailed AM and PM peak hour traffic movements of I-95 Interchanges with MD 152, MD24, MD 543, MD 715, MD 22, MD 155, MD 222, MD 272; and US 40 interchange with MD 2 are provided.

APG-BRAC Appendix D2 - 2015 with BRAC ADTs, April 2008, Maryland Department of Transportation, Sate Highway Administration, Regional and Intermodal Planning Division (Document 8)

This document contains 2015 BRAC turning movements prepared in 2008. Specifically, the daily traffic movements for I-95 Interchanges with MD 152, MD 24, MD 543, MD 715, MD 22, MD 155, MD 222, MD 272; and US 40 interchange with MD 2 are provided.

APG-BRAC Appendix G1 - 2030 with BRAC Turning Movements, April 2008, Maryland Department of Transportation, Sate Highway Administration, Regional and Intermodal Planning Division (Document 9)

This document contains 2030 BRAC turning movements prepared in 2008. Specifically, detailed AM and PM peak hour traffic movements for I-95 Interchanges with MD 152, MD 24, MD 543, MD 715, MD 22, MD 155, MD 222, MD 272; and US 40 interchange with MD 2 are provided.

APG-BRAC Appendix G2 - 2030 with BRAC ADTs, April 2008, by Maryland Department of Transportation, Sate Highway Administration, Regional and Intermodal Planning Division (Document 10)

This document contains 2030 BRAC turning movements prepared in 2008. Specifically, the daily traffic movements for I-95 Interchanges with MD 152, MD 24, MD 543, MD 715, MD 22, MD 155, MD 222, MD 272; and US 40 interchange with MD 2 are provided.

Aberdeen Area Intersection Study: Sim Traffic Networks - 2006 & 2015, April 16, 2009, Baltimore Metropolitan Council and Baltimore Regional Transportation Board (Document 11)

This is a presentation displaying the deteriorating conditions at six intersections in the area surrounding the Aberdeen Proving Grounds (APG) as a result of the Defense Base Closure and Realignment Commission (BRAC) recommendations. It shows the location of the intersections and the existing and 2015 PM peak level of service and volume-capacity V/C ratios. This presentation document is short on specifics of the assumptions used for the analysis; therefore it was classified as peripheral.

Traffic and Intersection Improvement Studies for Base Realignment and Closure: Aberdeen Proving Ground, June 2008, Maryland Department of Transportation, State Highway Administration, Regional and Intermodal Planning Division (Document 12)

This traffic and intersection improvement study for BRAC identified the study area (47 locations), conducted traffic studies involving traffic counts, forecasts, and analysis; identified congested intersections and developed recommendations for short-term (2015) intersection improvements and the each improvement's impacts. In addition, the study included sketch-level long-term needs analysis for the year 2030 that also involved an investigation of operations and identified next steps.

Evaluation of New Start Transit Projects, Journal of Public Transportation, Vol. 13, (3), pp. 65-77, David Laverny-Rafter (Document 19)

This document is a federally-mandated evaluation of New Starts Transit Projects.

Freight Review

Five documents were classified as peripheral, including:

National Freight Needs: Maryland's Freight Challenge is America's Freight Challenge, September 2007, Lance R Grenzeback, Cambridge Systematics (Document 13)

This presentation was given at the 2007 MD Freight Summit. It examines national freight needs, bottlenecks, and opportunities, and relates them to the Mid-Atlantic Rail Operations Study (MAROps) showing specific MD freight movements and their economic impact.

The impact of freight transportation on MD's job market is shown. It is based on the Cambridge Systematics MAROps reports contained in Documents 24 through 28; therefore, it was classified as peripheral.

WILMAPCO Regional Freight and Goods Movement Analysis, Final Report, September 2007, Cambridge Systematics and Global Insight (Document 35)

The purpose of this report is to better understand current and future freight flows in the WILMAPCO area, identify bottlenecks in the area's freight system, and recommend improvements. Estimates of freight flows were from Global Insight's TRANSEARCH database and focus on trucks. "Through" freight constituted 53% of all freight in the area, with the Port of Wilmington being the major freight generator. Truck tonnages were forecasted to increase 84% by 2030. Additionally, over 150 bottleneck locations were identified on highway-based projects. Since the focus is on truck movements, this information was classified as peripheral.

Delaware Freight and Goods Movement Plan - Technical Report, June 2004, Parsons (Document 36)
This report contains a specific plan of action to improve the movement of freight in Delaware as part of Delaware's Statewide Long-Range Transportation Plan. It is intended to guide freight investment for the next 25 years. Each transportation mode is examined in the report and constrained rail access to DE due to crossing over the Northeast Corridor is considered the primary rail issue in the state and discusses its impact on the state's ability to attract new rail business and better utilize its rail network. It recommends a new track on the NEC between Perryville, MD and Newark, DE to be used primarily for freight. This document contains recommendations as opposed to detailed analysis; therefore, it was classified as peripheral.

Delaware Freight and Goods Movement Plan - Executive Summary, June 2004, Parsons (Document 37)

This summary incorporates the issues and recommendations from Document 36, including its Technical Report. The first rail recommendation is the development of a new track on the NEC between Perryville, MD and Newark, DE used primarily for freight. It proposes an engineering study to assess the feasibility of this new track along the NEC as well as its impact on commuter rail operations.

Maryland Statewide Freight Plan, September 2009, Cambridge Systematics and Howard/Stein Hudson Assoc. (Document 38)

This plan reviews the current condition of Maryland's freight infrastructure and makes recommendations for improvements. Freight flows are estimated using Global Insight's TRANSEARCH database with a prioritized list by mode of projects to improve the movement of freight in the state. One of the major rail recommendations is to add a third track so trains can better access the Northeast Corridor from Port Road. This document contains recommendations as opposed to detailed analysis; therefore, it was classified as peripheral.

Planning and Policy Review

Two documents were identified as peripheral, including:

Cecil County Roadway Improvement Strategic Plan - Draft, April 2007, Johnson, Mirmiran & Thompson (Document 14)

This report evaluates projects and identifies future needs within the major growth corridors of central Cecil County including US 40, I-95 and several other higher functioning roadways.

The strategic plan presents AM and PM peak hour volumes and LOS for existing and future conditions in 2035. Roadway improvements and cost estimates for these improvements are recommended based on these analyses.

Delaware Long Range Plan, October 2010, Delaware Department of Transportation & Johnson, Mirmiran & Thompson (Document 18)

The plan contains a statement of the vision, principles and policies that will guide investment in transportation improvements in the state. Six planning scenarios are described and analyzed to determine impacts of various investment strategies. The plan analyzes key trends, recommends strategies, actions, and projects, sets measures to track plan performance, and identifies funding options. This document contains recommendations as opposed to detailed analysis; therefore, it was classified as peripheral.

Combined Economic Assessment

Thirteen documents were identified as peripheral, including:

An Interim Assessment of Achieving Improved Trip Times on the Northeast Corridor, October 2009, Amtrak (Document 5)

In response to the Passenger Rail Investment and Improvement Act of 2008, Amtrak must conduct a study of Northeast Corridor (NEC) improvements necessary to reduce trip time for Amtrak's high speed service, known as the Acela Express service, between New York, NY and Washington, DC and between New York, NY, and Boston, MA. This is an interim assessment of the estimated time frame for achieving the trip times, an analysis of any significant obstacles that would hinder such an achievement, and a general description and cost estimate of the specific infrastructure and equipment improvements necessary for such an achievement. This document is focused on the NEC as a whole; therefore, it was classified as peripheral.

DE Capital Transportation Program CTP 2011 - 2016, September 30, 2010, Carolann Wicks, Secretary (Document 17)

This report summarizes the Delaware STIP. By federal law, the MPOs are responsible for prioritizing all projects of regional significance and the State of Delaware retains ultimate responsibility for the programming of projects statewide. This report lists all of the projects in the six year plan. The first four years represent the fiscally constrained program.

All cost estimates assume a 3% inflation estimate.

Maryland HSIPR Application, August 2009, Maryland Assistant Secretary for Transportation Policy (Document 20)

Provides a brief, general discussion of the project, its benefits (including benefits to other types of rail services, livable communities, and economic recovery), and project partners. This document contains information that is general in nature; therefore, it was classified as peripheral.

A 2040 Vision for the I-95 Coalition Region: Supporting Economic Growth in a Carbon-Constrained Environment - Executive Summary, December 2008, Cambridge Systematics with PB and Telvent (Document 21)

Executive Summary of the 2040 Vision for the I-95 Coalition, which includes 16 states and the District of Columbia (Document 22). A key feature of the principles for the Vision was the goal of accommodating mobility and economic development while doing so within a smaller carbon footprint and with much less energy use while also promoting land use and quality of life objectives. The principles include: economic, environmental, energy, and transportation. This document is focused on the I-95 Corridor as a whole and is general in nature; therefore, it was classified as peripheral.

A 2040 Vision for the I-95 Coalition Region: Supporting Economic Growth in a Carbon Constrained Environment - Final Report, December 2008, Cambridge Systematics with PB and Telvent (Document 22)

Final Report for the 2040 Vision for the I-95 Coalition Region. It helps define the challenges, identify opportunities to enhance the vision, and discuss implications and next steps among stakeholders and decision makers. The document includes information on long-term demographic and economic factors, passenger and freight transportation demand, investment scenarios and their implications, implementation issues and associated benefits and costs, as well as policy implementation issues and associated considerations. This document is focused on the I-95 Corridor as a whole and is general in nature; therefore, it was classified as peripheral.

I-95 Corridor coalition Mid-Atlantic Rail Operations Study Phase I Interim Benefits Assessment, February 2004, Cambridge Systematics (Document 23)

The report and its appendices document existing conditions in the study area (demographics, economic conditions, transportation facilities, passenger and freight flows, etc.) and define a three-phased, 20-year program (2005-2025) of improvements to eliminate key rail bottlenecks across the five-state study region. It includes dedicated freight track to eliminate NS/passenger train conflicts between Perryville and Baltimore, Maryland. The order-of-magnitude cost estimates for the projects totaled $6.2 billion, while the estimated benefits of the operating plan totaled $12.8 billion, including $2.9 billion in direct shipper cost savings, $6.3 billion in highway congestion savings, and $3.7 in indirect benefits that result from the transportation savings. This document is based on Phase I findings (Phase II findings are also available); therefore, it was classified as peripheral.

I-95 Corridor Coalition Northeast Rail Operations Study, Phase II: Summary of Potential Rail Improvement Projects - Tech Memo 1, August 2009 (Document 27)

This report identifies strategic freight and passenger rail improvements that will support economic recovery and future economic development in the NE Region including Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, and New York State.

While this relates to the NEC improvements, it is outside of the WILMAPCO Region; therefore, it was classified as peripheral.

WILMAPCO 2030 Regional Transportation Plan, March 2007, WILMAPCO (Document 39)

This report provides a good overview of what WILMAPCO does and how a regional transportation plan is developed. It also provides an overview of the region and how it has changed and will change in the future. It discusses how projects are selected and the goals of supporting economic activity, growth and goods movement, efficiently transporting people, and improving the quality of life. The Chesapeake Connector is listed as an aspirational project in this report and does not provide detailed analysis; therefore, it was classified as peripheral.

WILMAPCO 2040 Regional Transportation Plan - Appendix B: Aspiration Projects, January 2011, WILMAPCO (Document 42)

This Appendix is a listing of WILMAPCO's aspirational projects. The list includes the location, project name, cost, type of project (for Transit only) and the source of the plan that describes the Project. The projects are broken down into categories: Transit, Roads, Bike/Pedestrian, and Multimodal). This list may be interesting to members of the Steering Committee who are interested to see what types of projects WILMAPCO is considering if they obtain additional funding, though it is not directly related to the Chesapeake Connector.

WILMAPCO 2040 Regional Transportation Plan - Cecil County TAX data (xls), January 2011, WILMAPCO (Document 44)

This provides demographic information and projections for Cecil County in Excel format. Data are organized by Traffic Analysis Zone (TAZ) and include number of households, population, and employment for the Years 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035.

WILMAPCO 2040 Regional Transportation Plan - New Castle County TAX data (xls), January 2011, WILMAPCO (Document 45)

This provides demographic information and projections for New Castle County in Excel format. Data are organized by Traffic Analysis Zone (TAZ) and include number of households, population, and employment for the Years 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035.

WILMAPCO 2040 Regional Transportation Plan - Cecil County TAX data GIS, January 2011, WILMAPCO (Document 46)

This provides demographic information and projections for Cecil County in GIS format. Data are organized by

Traffic Analysis Zone (TAZ) and include number of households, population, and employment for the Years 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035.

WILMAPCO 2040 Regional Transportation Plan - New Castle County TAX data GIS, January 2011, WILMAPCO (Document 47)

This provides demographic information and projections for New Castle County in GIS format. Data are organized by Traffic Analysis Zone (TAZ) and include number of households, population, and employment for the Years 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035.

Appendix B: Federal Transit Administration (FTA) Standard Cost Category (SCC) Descriptions

These categories were used to determine cost estimates for Options A and B.

Category 10, Guideway and Track Elements:

Item 10.1: Trackway Preparation, at grade; This item includes the removal of 12 inches topsoil, over an average 50 feet wide section. This equates to 1.9 cubic yards (cy) of removal per track foot. The unit price of this item assumes that the top soil will be re-spread along railroad right of way at the end of the project to establish a surface for seeding.

Item 10.2: Concrete Tie Track, Single Track; This item includes furnishing and installing all track material, including rail, ties, OTM, ballast, and sub ballast. It is for a single track, and in accordance with the typical sections. Ballast and tie track will be used throughout the project, including on bridge decks and tunnel inverts.

Items 10.3, 10.4, 10.5; These items include furnishing and installing turnouts and cross-overs, as identified in the table. Cost includes special track work, ballast, sub ballast, switch machine and switch heaters. Note that item 10.5 is a placeholder for a No. 10 turnout. Mason Dixon Co. Sand and Gravel is an industry which locates on the west side of the railroad at MP 55.870. At one time this industry was served by rail, via a trailing point turnout, in the south direction, from track 3. At the time of this writing, the turnout has been removed. This cost estimate does not include any cost for replacing the turnout; however, a placeholder (without cost) is included in the estimate to remind the reader of the industry's existence should there be a possibility of restoration of service.

Item 10.6: Remove No. 20 Concrete Tie Cross-over; This item includes all labor and material required to re- move existing No. 20 concrete tie cross-over and restoring track at Bacon Interlocking. This item applies to Option B only, and is necessary to accommodate the proposed turnout on the west side to access proposed track 4. There is no cost added for this item. It is assumed that Amtrak will remove the turnout at its own cost, recovering this cost through the salvage cost of the material.

Item 10.7: Remove No. 20 Concrete Tie Turnout; This item includes all labor and material required to remove existing No. 20 concrete tie turnout and restoring track at Bacon Interlocking. This item applies to Option B only, and is necessary to accommodate the proposed turnout on the west side to access

proposed track 4. There is no cost added for this item. It is assumed that Amtrak will remove the turnout at its own cost, recovering this cost through the salvage cost of the material.

Item 10.8: Shift Existing Track (Up to 8 feet); This item includes work required to cut and throw existing track, up to 8 feet. Item includes nominal ballast, cutting and re-welding rail, and labor to perform the work. This is work required to shift tracks to new alignments for the at grade option.

Item 10.9: Not Used

Item 10.10: UG 51.030 North East Creek; This appears to be a stone arch structure about 130 feet long. The structure deck appears to be sufficiently wide to accommodate a new track 14 foot offset from existing track 2, on the east side. While the structure is probably homogeneous throughout, given the size and age of the structure, an allowance was incorporated to make potential repairs to the structure.

Item 10.11: UG 51.120 Culvert; This appears to be either a box or stone arch culvert structure, about 25 feet in length. The culvert drains from the west to a basin or small lake to the east. The top of the culvert appears to be about 15 feet below the top of tie elevation. The trackbed above the culvert appears to be sufficiently wide to accommodate a new track 14 foot offset from existing track 2, on the east side. It was assumed that the existing structure is sufficient to support the proposed track. No cost was included to modify the bridge; however, a cost was included for rating the structure during the design phase.

Item 10.12: UG 51.140 McCullough Dr. / Railroad Ln.; This appears to be a box type structure, about 25 feet in length. The roadway surface below the structure is about 15 feet wide, and is not paved. The top of structure appears to be about 10 feet below the top of tie elevation. The trackbed above the culvert appears not to be sufficient to accommodate a track on the east side. Costs are added to construct a new culvert at 25 feet long by 20 feet wide.

Item 10.13: UG 51.330 Pedestrian Underpass / North Main St.; This structure appears very similar to UG 51.140. Costs are added to construct a new culvert at 25 feet long by 20 feet wide.

Item 10.14: OH 51.430 Northeast Rd. / Maudlin Ave. - (MD RT 272); This is an overhead bridge structure which includes two piers adjacent to tracks 2 and 3. There appears to be sufficient space to accommodate a new track 14 foot offset from existing track 2, on the east side, and not move the east bridge pier. However, the east bridge pier crash protection appears to be only 6 feet high. As the new track would locate about 12' adjacent to the pier, the crash wall would need to be increased to 12 feet high. A cost was included to increase the crash wall from 6 feet high, to 12 feet high.

Item 10.15: UG 51.880 Post Road - (MD RT 7); This is a stone arch structure which accommodates two traffic lanes under the railroad. The track alignment on the bridge is within curve 343. The roadway alignment under the bridge is within a reverse curve. The bridge does not appear wide enough to accommodate a new track. Costs are included to construct a new 75 feet long by 20 feet wide structure for purposes of locating the proposed third track.

Item 10.16: BA 51.940 Stoney Run; This is a tall stone arch structure carrying the railroad over Stoney Run. At the water level, the structure appears to be about 25 feet wide. The top of structure appears to be less than 5 feet from top of tie. While the structure is probably homogeneous throughout, given the size and age of the structure, an allowance was incorporated to make potential repairs to the structure.

Item 10.17: UG 52.640 Pedler's Run; This structure appears to be very similar to that of Item 10.16, with the exception that the width at water level appears to be 40 feet. As such, an allowance was incorporated to make potential repairs to the structure.

Item 10.18: UG 52.960 Broad Creek; This appears to be a box culvert type structure about 30 feet wide. The top of box appears to be less than 5 feet from top of tie. The width of structure is not sufficient to accommodate a new track. Costs are included to construct a new 50 feet long by 20 feet wide structure for purposes of locating the proposed third track. Note that the length of structure is greater than length of existing structure. This structure locates very close to the North East River. Understanding the sensitivity of the area the additional length should ensure that the bridge abutments can be constructed outside of the limits of the existing river.

Item 10.19: OH 53.510 Heisler's Road / Bladen St. - (MD RT 267); This is an overhead structure which appears to be very similar to that of Item 10.14. Costs are included to construct / increase the crash wall from 6 feet to12 feet high.

Item 10.20: UG 54.290 Stream; This is a tall stone arch structure carrying the railroad over a stream. At the water level, the structure appears to be about 15 feet wide. The top of structure appears to be less than 10 feet from top of tie. The structure does not appear to provide sufficient roadbed width to accommodate a third track. Costs are added to provide a 40 foot long by 20 foot wide structure. The additional length, 40 feet v s. 15 feet, is an attempt to locate proposed bridge abutments outside of the stream limits.

Item 10.21: OH 54.750 Weaver's RD / Ogle Rd. (MD RT 267); This structure appears to be very similar to that of Items 10.14 and 10.19. Costs are included to construct / increase the crash wall from 6 feet to 12 feet high.

Item 10.22: UG 56.260 Long Hollow Creek; Based on reference information, this structure was not located. Aerial information indicates sufficient right of way width between OH 54.750, and UG 56.510. Therefore, it was assumed no work would be required, and only a cost for rating the structure was included in the estimate. No cost for this work was included in Option A, as the proposed alignment would locate on structure at this location, and that cost is captured in the "Bridge Structure adjacent to NEC" cost item.

Item 10.23: UG 56.510 Carpenter Rd. /Mountain Hill Rd.; This structure appears to be about 30 feet in length, and about 30 feet wide. It is not sufficiently wide to accommodate a proposed third track. Costs are included to construct a new 50 feet long by 20 feet wide structure for the additional track. The additional length, 50 feet vs. 30 feet, is an attempt to avoid conflict between the proposed and existing bridge abutments. No cost for this work was included in Option A, as the proposed alignment would locate on structure at this location, and that cost is captured in the "Bridge Structure adjacent to NEC" cost item.

Item 10.24: UG 56.920 Principo Creek; Based on reference information, it is not possible to tell what type of structure this is. However, it appears to be at least 60 feet wide at the base, and, on the side slope on the east side appears to be insufficient to provide track bed for a proposed track. Additionally, this is the area where the proposed track shift would be occurring to re-align the tracks to the west. Because so much is unknown about his structure, an allowance was added for a proposed 80 feet long by 20 feet wide structure. The additional length, 80 feet v s. 60 feet, is an attempt to locate the bridge abutments outside of the creek limits. It is understood that during design, sufficient track bed might be available at this location to accommodate all three tracks; however, some form of mitigation with respect to parapets would be required. Given the unknowns, it was decided to be conservative, and include costs for a new structure.

Item 10.25: Retaining Wall Soldier Pile and Lagging; This item is a retaining wall used to maintain a railroad embankment. This item is only used where proposed track locates at or very near existing top of rail. Generally, the existing alignment locates on embankment with steep slopes on either side of the right of way. To minimize impacts associated with constructing new track on fill, an ALLOWANCE of 8 feet high wall for 1 mile in length was included in the estimate.

Item 10.26: Retaining Wall Soldier Pile and Lagging at North East River; This item is a retaining wall used to maintain a railroad embankment specifically at the North East River. This item is very similar in nature to Item 10.25; however, the unit price is greater than Item 10.25, to reflect the complications required to construct the wall. Those complications include a sensitive environmental location, minimal access for construction, and what would appear to be challenging sub-surface conditions.

Item 10.27: Retained Fill Structure - for grade separated option; This item is a T-Wall type retained fill concrete

retaining wall structure as manufactured by The Neel Company or equal. This item is used in Option A, for purposes of retaining the railroad roadbed as the alignment ascends and descends to achieve grade separation. This item is used to achieve up to 12 feet in vertical separation from the existing ground.

Item 10.28: Bridge Structure Adjacent to NEC; This item is a steel through girder or deck girder ballasted deck bridge. This item is used in Option A, for purposes of ascending and descending from retained fill structure to the Bridge structure over NEC, Item 10.29. This item consists of steel through girder or deck girder ballasted deck bridges of no greater than 75 feet span length.

Item 10.29: Bridge Structure Over NEC; This item is for a complex, multiple span, long bridge structure, on a flat skew angel over the NEC. This item is used in Option A. At the time of this report, the engineering for this bridge had not been fully developed. However, at the area where the grade separated alignment crosses over the NEC, the skew angle to the NEC will be rather flat. Therefore, it is anticipated that a series of varying size structures would be necessary to bridge over the NEC.

Category 20, Stations, Shops, Terminal, Intermodal:

This category was not used in the estimate.

Category 30, Support Facilities: Yards, Shops, Admin. Bldgs.:

This category was not used in the estimate.

Category 40, Site work & Special Conditions:

Item 40.1: Utility Relocation - FOU; This item includes cost to re-locate the Fiber Optic Utility located on the west side of the right of way. The cost is in route miles, and is based on a similar utility relocation project. The size for the FOU is unknown.

Item 40.2: Utility Relocation ALLOWANCE; This item attempts to capture the cost associated with relocation of utilities other than FOU, which may be impacted by construction of additional track. Because of the limited knowledge a cost per rail foot was developed to quantify potential utility relocations. A research of utilities was not performed as part of this study.

Item 40.3: Clearing and Grubbing; This item includes clearing and grubbing of existing vegetation which locates within the work limits as established by the typical sections. For estimating purposes, a nominal 25 foot wide section was assumed to require clearing and grubbing for the length of the project. While item 10.01

assumed a 50 foot wide section for top soil removal, observation indicates that vegetation along the right of way is cleared to a point about 25 feet from existing tracks.

Items 40.4 - 40.6: Embankment Construction General Excavation and Ditch Excavation; field observation indicates that the alignment locates within existing cuts, on embankments, and on nominally flat area. The cut sections appear to be as high as 15 feet, and the embankment sections achieve at least 15' as well. For purposes of estimating, three typical sections were developed to quantify earthwork; these include a typical cut section, typical embankment section, and typical ditch section. For cut and fill, the height or depth was set at 10 feet. For the general ditch section, the ground elevation was set level, with ditch excavation being the only work assumed. These sections were used to develop an earthwork quantity per track foot, per section. The sections were then applied to the alignment, as appropriate, based off available information. It is assumed that any excess excavated material will be stockpiled on Amtrak right of way.

Item 40.7: Drainage ALLOWANCE (Perforated Pipe); This item quantifies an underdrain/perforated pipe sys- tem, which would be necessary were the right of way drainage cannot be achieved using ditches, but where a conventional storm sewer would not be appropriate. As stated in Item 40.7, drainage design was not included at this level of engineering, but it is anticipated that it will be necessary to include this item in the final design effort. It is anticipated that this item would be essential for Option A; however, an ALLOWANCE of one mile was included for Option B as well. The item includes an allowance for 18" perforated corrugated metal pipe.

Item 40.8: Drainage ALLOWANCE (Storm Sewer); This item quantifies a storm sewer system, which would be necessary at locations where right of way drainage cannot be achieved by employing ditches. This level of engineering did not include a drainage design, but it is anticipated that during subsequent design efforts, storm sewer needs will be identified. As such, an ALLOWANCE of one mile for this item was included in the estimate. The item includes allowance for 24" reinforced concrete pipe, and drop inlets spaced on 500' centers.

Item 40.9: Environmental (E&S); This item includes all temporary and permanent erosion and sedimentation control devices including but not limited to silt fence, hay bales - check dams, rock construction entrances and seeding.

Item 40.10: Mobilization; This item includes cost associated with Contractor's mobilization and demobilization of staff and equipment. It also covers material the Contractor will need to purchase up front to begin work. The cost for this item is a percentage of the Construction Subtotals - Categories 10 - 50, as indicated in the table.

Item 40.11: Temporary Maintenance of Traffic; This item includes temporary maintenance of traffic at the 5 existing under grade bridges during construction activities.

Item 40.12: Environmental Mitigation ALLOWANCE @ $100k / mi; This item includes an allowance for mitigation of unknown elements discovered during earthwork activities. Generally, such items uncovered on railroad right of way would be moved and stored on railroad right of way; however, it is unknown what Amtrak's wishes are with respect to this item. Therefore, this allowance was included in the estimate.

Item 40.13: Environmental Mitigation at North East River - ALLOWANCE; This item is an ALLOWANCE for environmental mitigation and permitting which will be required for construction activities adjacent to the North East River. This measurement is in units of Acres. Acreage area includes from east limits of work activities, to the edge of river for the length of alignment adjacent to the river. Note that the horizontal offset from work limit to river was measured in Google Earth, and it is unknown if the river was at high or low tide when the area was photographed. As well, this assumes that no work will be performed in the river.

Category 50, Systems:

Item 50.1: Traction Power Substation Modifications - ALLOWANCE; This item is an ALLOWANCE for upgrades to the traction power substation which provides power to the section of catenary between Bacon and Prince Interlockings. Adding a track in this section will introduce additional power requirements from the substation. Offline conversations with Amtrak staff indicate that the existing substation should be sufficient to handle the additional power requirements, however, without an engineered study, this is still an unknown element. As such, an ALLOWANCE was added to attempt to capture unknown costs associated with this item.

Item 50.2: Electrification - OCS Using Existing Structure (Wire and Hardware Only); This item includes costs for furnishing and installing new catenary wire, hardware and appurtenances for the proposed track. The catenary wire would utilize existing catenary structures.

Item 50.3: OCS Using Proposed Cantilever Structure - Single Track; This item includes costs for furnishing and installing new catenary wire, hardware and appurtenances, new catenary pole, cantilever, foundation and guy wires. This item applies to areas where the proposed track locates outside of the limits of the existing catenary structures.

Item 50.4: Remove and Install Catenary Structure (Cantilever Structure); This item is very similar to Item 50.5, however this item includes costs for furnishing and installing a new cantilever catenary structure.

Item 50.5: Remove and Install Catenary Portal Structure (3 - 4 Track Structure); This item includes costs for furnishing and installing a new 4 track catenary structure, foundations, and appurtenances adjacent to an existing catenary structure, attaching the existing catenary, signal and high voltage lines to the new structure and demolishing / removing the existing catenary structure. This item applies to areas where the proposed track will locate nominally 14 feet adjacent to the existing track, and the existing catenary structure width does not pro- vide sufficient clearance to the existing track.

Item 50.5: Remove and Install Catenary Structure (Cantilever Structure); This item is very similar to Item 50.4, however this item includes costs for furnishing and installing a new 4 cantilever catenary structure.

Item 50.6: TCS for New Track; This item includes furnishing and installing all equipment / material required to provide a Train Control System for the proposed track.

Item 50.7: Signal Modifications at Bacon Interlocking; This item includes furnishing and installing all equipment material required to modify the signal system at Bacon Interlocking and distant signals to support the proposed schematic changes at the interlocking.

Item 50.8: Signal Modifications at Prince Interlocking: This item includes furnishing and installing all equipment material required to modify the signal system at Prince Interlocking and distant signals to support the proposed schematic changes at the interlocking.

Category 60, Right of Way:

Item 60: Right-of-Way: Right-of-way includes property, other than that which is currently owned by Amtrak, which would require purchase for construction of the project. Property lines / limits were established by GIS data provided by Cecil County MD. Right-of-way limits are based on the needs of the typical section, that is to say that only areas of property required for construction and future operation was considered necessary to acquire; purchase of entire lots was not included in the estimate. A detailed analysis of individual properties was not performed at this time. Instead, and average property value was established for Cecil County, and that cost per area was applied. The cost per area was doubled to include legal costs and other unknown elements which would present themselves at the time of purchase.

Item 60.2: Temporary Construction Easement; This item provides an ALLOWANCE for costs associated with acquiring temporary easements for purpose of constructing the project. The intent is that upon completion of the project, all property is returned to the existing owner and in the same condition prior to construction.

Category 70, Vehicles:

This category was not used in the estimate.

Category 80, Professional Services:

Items 80.1 - 80.7; These categories itemize costs for what is typically referred to as soft costs. Soft costs include items such as surveying and engineering, construction monitoring, insurance and bid bonds associated with construction, permitting, and testing. All elements in category 80 calculated based on a percent of the construction subtotal. Overall, category 80 includes about 35% of the construction costs. This is a typical percentage based on experience with other large publicly funded railroad / transit projects.

Category 90, Unallocated Contingency:

Item 90.1: Project Reserve; This item represents project reserve, or what is commonly referred to as unallocated contingency. It represents a contingency factor applied to the sum of all cost categories, except category 60, right of way, and category 80, professional services.

Appendix C: Interviews

The following appendix includes documentation of information learned from stakeholder interviews for the Chesapeake Connector project. The agency, representatives interviewed, and the date of the interview are listed below. The order presented below is the order of the interviews in the document.

Exhibit C-1: Chesapeake Connector Stakeholder Interviews

Agency	Contact	Interview Date
Railroads and Engineering		
Amtrak	Jeff Gerlach Stan Slater	7/7/2011
Norfolk Southern	Laura Hoag	11/22/2011
Norfolk Southern	Rick Crawford	7/11/2011
Freight		
Multiple freight stakeholders	Rail Summit	6/14/2011
MD&DE Railroad	Eric Callaway	11/21/2011
Port of Baltimore	Dominic Scurti	12/16/2011
Sussex County Economic Development	Julie Wheatley	12/7/2011
Passenger Rail and Transit		
DelDOT	David Campbell Albert Loyola	7/1/2011
MTA/MARC	Ira Silverman	11/21/2011

Amtrak

Description:

A meeting was held with Amtrak personnel on July 7, 2011, to discuss the Chesapeake Connector project. The meeting was held at Amtrak's office located at the 30th Street Station in Philadelphia, PA.

Attendees:

WILMAPCO: Dave Gula (DG) (via conference call), Dan Blevins (DB) (via conference call) Amtrak: Stanley J. Slater (SJS), Jeff Gerlach (JG)

IHS Global Insight: Joe Waldo (JW)

AECOM: Sashank Singuluri (via conference call), Steve Kley (SK)

Meeting Part 1 (discussion of pre-developed questions):

Prior to the meeting, the project team submitted a series of questions to Amtrak for discussion at the meeting. A summary of that discussion is as follows:

1. **Question:** Please identify / define the freight train operating window criteria.

Response: *Stan Slater (SJS) indicated that he was not able to locate a written agreement which precluded operations of freight trains from the North East Corridor (NEC) within a defined time window. However, he did indicate that the Amtrak Operating Department works with the Norfolk Southern (NS) Operating Department to orchestrate as many NS moves on the NEC as possible between the hours of 10pm and 6am. Additionally, SJS stated that between the hours of 6am and 10pm, NS' ability to move trains on the NEC is minimal due to Amtrak and MARC operations.*

a. **Question:** How are exceptions to the window criteria handled (case by case, or weekly etc.)?

Response: *SJS indicated that moves which occur during daytime are handled on a case by case basis.*

b. **Question:** What are the limitations placed on freight train track speed while operating within the identified window?

Response: *SJS stated that the timetable speed for freight train operations is the same regardless of the time of day.*

c. **Question:** If freight operates on the NEC outside of the defined window, what operating restrictions are placed on those trains?

Response: *SJS stated there are no special restrictions for freight train operations in daylight hours vs. night operations - the same operating rules apply. However, SJS reiterated that moving freight trains during daylight hours is problematic due to Amtrak and MARC operations, and that typically it will take much longer to move a freight train between two locations in daylight hours than at night.*

2. **Question:** Could Amtrak provide a train history showing dates, times and train number / symbol, for trains operating within our project limits, or passing a location close to the project?

Response: *SJS stated that he would inquire with the Amtrak Operating Department to obtain the requested information.*

3.**Question:** How will future HSR plans impact the project location?

Response: *SJS provided Steve Kley (SK) and Joe Waldo (JW) copies of the "Northeast Corridor Master Plan/Programmatic Environmental Impact Statement Track Configuration; Chesapeake Headlands Territory, Alternates 2b and 3." Alternates 2b and 3 represent proposed changes to the existing schematic for accommodation of High Speed Rail (HSR) operations. The schematics cover the area on the NEC between milepost (MP) 30, at Newark, DE, and MP 60, at Perryville, MD. SJS indicated that Schematic Alternate 2b is Amtrak's preferred schematic. SLS and JG indicated that these schematics are confidential and not to be distributed.*

4. **Question:** There have been previous studies to provide an additional track between Bacon and Prince. Does Amtrak have any information from those studies that they could share which might provide information that is not currently known to the design team?

Response: *SJS stated that Amtrak has performed previous high level engineering tasks related to the Chesapeake Connector, but did not have a copy of those reports at the time of the meeting. SJS stated that he would inquire with the engineering department for locating said documents.*

a.Question: As well, could we speak to Amtrak field staff familiar with the project area that might be able to identify existing physical conditions which could impact the future construction of the additional track?

Response: *SJS stated that if the documents indicated above did not answer the project team's questions, he could arrange for a meeting with a representative of the Amtrak engineering department.*

5. **Question:** What is Amtrak's preferred schematic for an additional track between Prince and Bacon?

Response: *As indicated in the response to question 4 above, Alt 2b is Amtrak's preferred schematic. This is a grade separated option.*

6. **Question:** Are there any unknown factors Amtrak wishes the design team to identify in the report?

Response: *Amtrak does not want future commuter operations placed on tracks 2 or 3, where they would need to use tracks 2 or 3 for a station stop at the future Elkton station. Amtrak stated that if commuter operations are introduced in the future between Perryville and Newark, any stations constructed between those two points, for commuter operations, would need to be constructed with high level platforms. This is the current direction which Amtrak is receiving from the FRA.*

Meeting Part 2 (general conversation):

1. Amtrak discussed some general desires for future operation conditions within the project limits:

a. For any schematic to be considered, tracks 2 and 3 must be maintained continuous through the project limits.

b. It is Amtrak's desire that proposed schematics route freight operations and future commuter operations to the east side of tracks 2 and 3, within project limits. However, this presents a challenge at the south end of the project, where freight and future commuter operations need to be shifted to the west side of tracks 2 and 3, assuming tracks 2 and 3 remain on their existing alignment.

c. Amtrak questioned if the Project team was considering any options which would include a freight alignment crossing the NEC within the town of Perryville. SK stated that while this option was discussed in the kickoff meeting, WILMAPCO has eliminated the option, due to disruption to the town of Perryville.

d. SS stated that Amtrak is currently planning for an increase of Acela operations from one hour headways to thirty minute headways. SS indicated that this will severely decrease already limited windows for freight during daytime hours.

e. A new rail bridge over the Susquehanna at Perryville is also being considered by Amtrak as a NEC improvement in the area. This might affect commuter and freight train operations, but is a long-term project beyond the scope of the Chesapeake Connector.

2. Discussion of Proposed Schematics:

a. The Chesapeake Connector Project is analyzing the NEC at two levels. The safety, economic, and public benefit study groups are analyzing the project at a macro level. That is to say, increasing capacity within the 6-mile segment between Prince and Bacon Interlockings will increase capacity along the NEC from Wilmington to Baltimore, having the potential to benefit multiple public and private beneficiaries in multiple geographic locations. The engineering study group is analyzing the project at a micro level, limiting its work to the defined 6-mile project limit. Unfortunately, while adding a third track between Prince and Bacon interlockings will add capacity, a proposed schematic to do so cannot be made to fit with, or be easily modified in the future to mesh with Amtrak's proposed Alt 2b and 3 schematics. As such, the engineering study must review Amtrak's proposed schematics and attempt to develop a schematic which will meet the needs of the project scope, and identify how the schematic could be modified to fit together with future NEC HSR

schematics.

Follow Up:

1. SK to follow up with SJS on three items:

a. Train activity report from Amtrak Operating Department.

b. High level cost estimates for additional track between Prince and Bacon from Amtrak Engineering Department.

c. Previous engineering study documents from Amtrak Engineering Department for the project area.

Attachments:

There are no attachments to this document. The items distributed by Amtrak during the meeting were considered confidential. As such, those documents have been previously distributed to the team members on an as needed basis.

Norfolk Southern - Operations

Description:

A meeting was held with Norfolk Southern Operations on November 22, 2011 to discuss the Chesapeake Connector project. Joe Waldo met in person at Norfolk Southern, while the AECOM team members participated via conference call. The meeting was held at the railroad's operations trailer in Wilmington, DE.

Attendees:

NS: Laura Hoag, Jack Trybus

AECOM: Toni Horst, Carey Barr, Steve Kley (all by conference call) Global Insight: Joe Waldo

Meeting Part 1 (discussion of project background and questions):

The discussion began with an overview of the project and the team's initial finding that we're seeing fewer benefits than anticipated which surprises us given the amount of interest in the project. Our goal was to talk to NS to test our initial impressions and see if that matches intuition and what NS is seeing. The project team is starting to gear up to deliver bad news and we're concerned that we haven't fully looked at all the right data.

1. **Question:** Baltimore - how does it affect Baltimore?

Response: *Harrisburg division map. All Baltimore traffic goes through Perryville where there's the bottleneck. All NS traffic (coal too) has to be fleeted and run in opposite directions in a 7 hour window. NS worked hard with Dave Gula to explain how critical it is. Conrail looked at short lining the area years ago. NS doesn't want to anymore; wants it to be a Class 1 to serve customers and build revenue. But if that means the state will attempt to take track capacity out of the major operating yard and look for funds where they can't afford to operate, we're not in a good position. Problem is that financially Delaware and Maryland don't have a lot of money to put into this.*

2. **Question:** Steve Kley - Would NS think about moving capacity from Chrysler to Edgemoor?

Response*: Dave Gula said it's not an option because of drainage issues at Edgemoor. The area is prone to major flooding, as in 5 feet of water in 45 minutes. They end up moving 4-500 cars out of Edgemoor to other locations to protect equipment.*

3. **Question:** If you did 100,000 carloads in 2011, and Connector is built and service improves - what would be the new carload capacity?

Response: *LH would say within first few years you'd want to get all major players on board with expansion so you see economic benefits immediately. A 20% increase would not be unreasonable based on what customers are saying. Getting it out of the way of Baltimore is a huge benefit. We can't physically load enough coal to export and have to turn contracts away. We don't have enough capacity to get the trains in there. Chesapeake Connector is its name because they understood that this is all interconnected, and when you think of the stronger storms, look at LA and New Orleans. If you look at a major storm taking out a major port for even 3 months, what does it do to the east coast infrastructure? That's another thing to think about when you think about infrastructure and system-wide capacity. What is the ability to re-route? Baltimore is very difficult to re-route. The storm after Irene took out the mainline track. Rail helps rebuild an area faster than trucks usually, which helps local recovery. Probably doesn't factor in for our study, but federal emergency*

management should at least be qualitatively mentioned.

4. **Question:** If you had to name 2-3 customers to talk to, who would they be?

Response: *Claymont, Port of Wilmington, Delaware City Refinery, Mount Air Farms. Customers know that it's important to look forward to improve their service, so at some point NS may need their support.*

5. **Question:** Crew issue that MD/DE RR mentioned?

Response: *This is a crew issue, not a volume issue at Harrington to Enola. What ends up happening is a traffic jam so crews get held out for 10-14 hours. 12+ hours means they need time off to sleep, and aren't able to work the next day so the train is held up. It is not due to a lack of business, it's due to too much business.*

6. **Question:** SK - Are the 12 and 13G trains daily trains? 30 and 31A - do they always terminate at Edgemoor? Or do they terminate at Chrysler?

Response: *Yes. Rick thought they were 5 days a week, but they are not. Only 1 train doesn't run outbound one night a week and that's the 13G. We do 6 days a week on 12G, 13G. Rarely terminates at Edgemoor, which would be the goal. 6-7 months ago on Amtrak and window got shortened and performance started to decrease, trains stopped making it in, so now they terminate at Newark.*

7. **Question:** List of customers who would potentially utilize extra capacity?

Response: *Mountair Farm (chickens) in Frankford, Delaware; Maryland & Delaware Railroad; Pennsy Supply (aggregate and asphalt) in Harrisburg, PA; H&K Group (aggregate) in Millsboro, DE; Kraft; PPG; Delstar Tech (thermoplastics) in Middletown, DE; Port of Delaware; Delpro Yard in Bear, DE.*

Meeting Part 2 (general conversation):

Discussion of freight rail

So many operational improvements, but could be freight business to be gained if service was more reliable. But so far we haven't seen much of it, which doesn't mean it's not there. Definitely business to grow, like the Port of Wilmington.

Poultry and agriculture could see a 20-30% increase dependent on chicken issue/poultry prices.

Claymont Steel predicts a 20-30% increase in business. Delaware City (refinery) is not even at 100%production level yet. A big concern is operating over Amtrak's NEC. Customers come from Baltimore, Harrisburg, and a lot of customers are throughout the Mideast area.

Newark Train Station Study - NS's opinion is on the table, met with them 3 years ago, told them capacity couldn't be lost, recommended the station be located north of Davis. But they decided against it. The plan cuts the capacity of the yard in half for NS. It is a lifeline for freight on and off of the Delmarva. All of the traffic comes in from Harrisburg and Conway and Newark down to Harrington or Indian River or comes through Newark to Edgemoor, locals through area too. Newark is the serving yard. A lot of local traffic in there, but Newark is cut off by Amtrak issues from time to time so they try to do as much work as they can from other areas. NS has a 10pm - 6am window on the NEC. Another train was added, so the window is really more like 10pm - 5am. Amtrak wants to do work at night and there are frequent outages of 4-6 hours in duration. That doesn't leave enough time to run the freight traffic, so more and more freight trains are running outside of the windows which is a significant safety issue. It will only get worse if the station goes through with increased passenger traffic. NS was asked to contribute $3.5M. NS bottlenecked, having a hard time handling capacity right now. Complaints are coming from the Port of Wilmington and the AutoPort (Honda, GM, and Chrysler). Track expansion has been on the books for 4-5 years, but they have pulled out $1M in its funding, so Honda and GM may not continue to ship through the state of Delaware.

Refinery business in the area - Tetco (fuel and chemicals) up from Delaware City to Port of Wilmington used to be on trucks and is now on rail. NS has invested millions in infrastructure in the last 3-5 years in a territory that doesn't have a return on investment and this despite going through the recession. 4-6 customers in Salisbury have asked for service but can't get help to rebuild infrastructure. 6-7 industrial development projects who want to invest multimillions in expanding, but shaky because of economic environment and also because NS isn't consistent on service. NS can't get a train in on time because of the window problem. Connector is a small, expensive project, but would open up 3rd track. Would provide some distance so freight isn't running in close proximity to HSR which is a public safety benefit.

NS has significant challenges in the area in terms of the political support and operations support. Rail is important in MD, DE, S. PA, and VA; don't just think of it as passenger rail.

Freight traffic window will be choked off if you combine passenger and freight. Newark Train Study will severely impact NS's ability to serve customers in the area properly. Operating ratio will go sky high; it may not even be financially feasible. There will be more trains, more crew, smaller trains, operating outside the window. The 3rd track is a small piece of it, but if we could at least get that, getting down to Baltimore is a whole other issue. NS already can't operate within the window today, and with overlapping freight and

passenger service on the same tracks, there is an increased potential for a major incident which may cause lives. It can be done safely, but there's a greater risk by not having the separation. The 3rd track would allow you to run traffic 24 hours a day at least in 1 direction from Perryville. Without improvements out of Baltimore, still 8 hour window. There is stone and agricultural traffic that could pick up. Depending on the energy direction, coal could pick up again. NS is running very little coal which could pick up. Refinery traffic will increase since they're not at 100% production. Port of Wilmington has lots of opportunity to grow, would take some investment. Baltimore is over capacity right now.

Tasker Siding is being funded by DelDOT and NS which will give full siding along the New Castle Secondary.

Discussion of industries

Wind energy would be a great opportunity for the state. The Port of Wilmington has imported turbines for off-shore wind power and is currently trucking them. Rail track curvature would have to be straightened out and the port isn't interested in spending money on that. If the state of DE looked at major wind energy, there are lots of opportunities along the Eastern Shore. Wind power is an excellent energy solution which would provide jobs and alternative energy. Wind turbines are enormous and don't shift easily on trucks.

DuPont, Claymont, Delaware City are customers.

Autoport (New Castle, DE) has numbers that are below the 2007 level of over 100,000 carloads. Laura to send numbers.

IKO (roofing products) is a fairly small company but looking at a potential increase of $2.5M revenue. They have already expanded part of their facility.

The Petco building is a good environmental story. Previously shipping by truck, the black ash out of the dump trucks would go right on your vehicle. Now, they have it in rail cars from Delaware City and it gets offloaded more safely and doesn't make the mess it used to on the roads.

Claymont Steel is talking about a 20-30% increase in business. 3,200+ carloads per year. Traffic would come in and off of the Connector. They are inbounding steel, not just outbound, which involves high and wide traffic. Huge advantages to having that on rail and not on truck for safety reasons, but you have to be very careful with passenger traffic alongside high and wide rail.

The People's Industrial Park in Delaware is a 196 acre Greenfield site adjacent to track with potential to market that space to steel customers.

Next Steps

Follow up with Laura about Autoport numbers.

Speak with NS planning or marketing lead to get a handle on carload potential and key industries.

Perhaps the VP of Strategic Planning (John Friedman) or operationally, the Harrisburg Division

Superintendent (Patrick Whitehead). May want to include General Manager (Gerry Call?) Will want to discuss major system issues like flooding - freight will get up and running faster, passenger service will be suspended. How sensitive is service in their point of view?

Should talk to marketing guys at NS, and some companies in the area? NS has a PowerPoint that is an internal document, but LH will work to get it so she can share it. Let's arrange for conference calls soon since we're up against deadlines. Laura recommends getting scheduled quickly with major players and then let them prepare with key information as a web conference. Laura will initiate that tomorrow. Project team prefers the first or second week of December.

Norfolk Southern - National

A meeting was held at the Norfolk Southern Railroad (NS) offices in Washington, DC on August 11, 2011 to discuss the Chesapeake Connector Project and freight traffic on the NS Delmarva secondary.

Attendees:

IHS Global Insight: Joseph Waldo (JW)

Norfolk Southern: Rick Crawford (RC) Special Assistant, Public Projects; David Kritz (DK), General Attorney; C. Scott Muir (CSM), Assistant Vice President Government Relations; Richard A. Marrs (RM), Government Relations

The Byrd Group: Robert L. Byrd (RB), President

Meeting:

The meeting started with a general discussion of the Chesapeake Connector Project, WILMAPCO, and overall status. JW noted that AECOM needs historical and projected rail freight data from NS in order to accurately

calculate the freight benefits from the Connector. They can use Global Insight's TRANSEARCH data or estimates from NS.

CSM and RM discussed past NS involvement in the Connector project and asked if AECOM was taking any position on funding of the project. JW indicated that the project was an economic impact calculation to support possible eventual funding of the Connector or not. CSM and RM stressed that while NS support the Connector, NS was not in a position to provide funding for any part of the project. It was important for AECOM and the report to understand NS's position on that subject. JW noted that he understood and would convey the NS position to AECOM.

RC then provided a number of hard copy data and reports on the Delmarva line. These included:

1) Delmarva Peninsula Companies with greater than $10 M revenues (25 pages) - includes company name, contact, phone, and whether the company is within 5 miles of NS rail. No freight volume data

2) NS Delmarva Peninsula Opportunities (15 pages) - PPT presentation outlining total freight activity on the peninsula by mode (using one of our old TRANSEARCH data bases) and potential opportunities for new NS traffic. Opportunities are stated very generally with no identification of specific shippers

3) NS Average Daily Train Counts (1 page) - Map of NS mainline segments between Allentown and DC with average daily train counts. Counts are also broken out by auto, bulk, intermodal, and merchandise.

4) Delmarva NS Train Frequency (3 pages) - Spreadsheet of each train number that serves the Delmarva line, o/d route, and weekly frequency (7 days/week, 3 days/week, infrequent, etc.)

5) NS Delmarva Business Unit profile (3 pages) - Overview of NS infrastructure on the Delmarva lines (# of track-miles, movable bridges, , employees, yards, etc.) as well as 2008 total carloads (# of cars) by three line segments (Port of Wilmington, Porter-Harrington-Delmar, Indian River Secondary) and total for the line. Total carloads on the Delmarva line are compared to 2006, 2007, and 2009 as follows:

2006: 100,050
2007: 100,110
2008: 85,775
2009 (estimate): 60,000

JW noted that the data in #5 would be most relevant for the project but would like it broken down by commodity or shipper. RC indicated he would try to get more detailed data.

Follow up

RC to provide JW with more detailed rail traffic flow data on the Delmarva secondary

Port of Baltimore

Description:

The team spoke with Dominic Scurti from the Port of Baltimore by phone on Friday, December 16, 2011.

Attendees:

MPA: Dominic Scurti

AECOM: Toni Horst, Carey Barr Global Insight: Joe Waldo

Discussion of project background and questions:

Dominic was familiar with the project and understood it is investigating adding an extra track on the Northeast Corridor (NEC). The team is taking a look at the potential freight benefits of the Connector in terms of additional freight which can locate on the Delmarva or through the Port of Baltimore as a result of impacts of the Connector, or if there are operational efficiencies for Norfolk Southern (NS) to the region from the project. There has been discussion about the new track improving service not only into Delmarva but also into Baltimore, including the port. The team was advised by NS and others to discuss the current level of service at the port and how staging of equipment at the port may be affected by the project.

1. **Question:** How is service by NS to the Port now? Are there issues which might be addressed by the Connector if it happened?

Response: *Given the operating constraints that NS has on them by Amtrak on the NEC, service is pretty good. There are occasional hiccups here and there that cause delays which leaves customers waiting for cargo at the Port. Say a train arrived at Perryville at 8, they have to wait till the following morning to bring it down. Those types of constraints are the biggest issues that Amtrak has placed upon NS but it happens infrequently. Anything the Connector could do to alleviate those constraints would be beneficial.*

When shipping over-dimensional cargo, the catenary lines prevent cargo from being bigger. This issue won't be solved by the Connector though.

2. **Question:** Is the typical delay no more than 24 hours?

Response*: Yes, if cargo is in Perryville it's no more than 24 hours. It doesn't happen that frequently because NS does a good job of managing that, but there is an occasional hiccup once or twice a year. However, as more traffic is being put on the rail, train capacity may get constrained.*

3. **Question:** Is there a cost to shippers for waiting a day at the Port for the inbound cargo? Is the ship delayed?

Response*: Not usually since shippers build in transit days for unforeseen delays when shipping by rail. But if the ship stays, there could be charges depending on what kind of ship it is, whether it's chartered, etc. If the owner of the ship doesn't wait, then the cargo sits there until it can get on another vessel. Depending on how often the sailings/vessel bookings are, it may not be easily rolled onto the next vessel. It might be another month until it leaves the port. MPA doesn't charge them to wait there, but the leasing operator may charge. The costs are negotiable depending on who it is and what kind of cargo. MPA doesn't charge but the terminal operator may for "miss-sailing" or whatever the contract says. Again, this is rare since rail shippers add transit days to their shipments to account for delays.*

4. **Question:** How often does that occur, a couple of times a year?

Response: *Yes that we are aware of. Not that often. They try to make sure the cargo is there a few days before. If there is a Friday sailing, they want the cargo at the pier by Wednesday. If shipping by rail it arrives Wednesday or the Friday before. In anticipation of a delay, it will still get there on time.*

One instance was cargo leaving from the Midwest; it was late at getting to Perryville at 10am for a vessel to get out the next day. The cargo had to wait there until the next morning.

5. **Question:** What about staging equipment for outbound shipments? Are there issues because of Amtrak access that keeps the railroad from bringing in equipment in a timely manner?

Response: *Not that I'm aware of. Most of the port traffic is exports from the Port, and due to the nature of what is imported and unloaded from the ship, most goes out by truck. There are a lot of empty cars leaving the system. Not aware of too much delay due to NEC restrictions.*

6. **Question:** What is the primary inbound cargo?

Response: *Box cars bring in paper/pulp. Inbound construction and agricultural machinery, tractors, excavators (to be exported). Automobiles inbound, some by rail to the US. Most automobiles come to the port for export. Coal is an export, a very big one for NS, and there are some intermodal boxes. The port does 12,000 containers per year, which is relatively small compared to other ports. NS has an intermodal terminal and trucks them back and forth to marine terminal. Relatively small volumes.*

7. **Question:** Is there any business the Port might be able to get if the connector happens?

Response: *NS made it work with the restrictions. Anything to help them out would help the port, but they've made it work. I can't see much more business occurring from the Connector.*

8. **Question:** If NS could come at a different time/wider window, would that affect Port operations for the better? Or are operations working around when the train comes in? Would it change at all?

Response: *It would maybe change their operations somewhat at the Bayview facility where they bring trains in, but wouldn't necessarily change operations at the MPA.*

9. **Question:** Are there commodities that may be shipped in/out by rail if the Connector project was completed?

Response: *Not aware of any additional commodities we could gain if there were a larger window from the Connector. Everything is already staged with the extra day or two in mind, shippers know to give extra time for holdups. Train capacity is a concern and MPA is watching it and working with NS to help increase the window, but the biggest constraint is the geometry of cargo size coming down.*

10. **Question:** How do you bring that high-wide down now?

Response*: If it's into Baltimore, it comes in by NS by rail, or by truck. Or else they divert it to another port with better clearance. That's NS's only route into Baltimore. Not sure CSX would have any better clearances. CSX could come from the west getting into Baltimore, but the Howard Street Tunnel has the same clearance problem. Freight is constrained by clearances designed a hundred years ago that are very expensive to change now.*

11. **Question:** How many cars per year go on NS?

Response: *Can only say what happens at the MPA terminals. In terms of box cars in 2010 for NS only to Dundalk Marine Terminal (main): 4400 box cars, 1700 flat cars, and 3800 auto racks. Through the first 10 months of 2011, it's 3900 box cars, 3200 flat cars, 5000 auto racks. It was a good year for the port and 2012*

is looking even better.

The good numbers are attributed to the pickup in the economy, especially to the stimulus packages which encouraged the need for equipment. Excavators, construction equipment, farming sector: agricultural machinery. Auto carriers - Chrysler has a tremendous success exporting their cars. Pulp and paper to various foreign mills. And 12,000 containers and that's the total at the port. Coal has been booming as well, judging by export data from the port.

12. **Question:** Have you heard from the private terminals about significant service issues with NS?

Response: *No, there are not as many private terminals on that side of the harbor. NS serves 1 side of the harbor. There are only really 1 or 2 private terminals and they're not big into rail. Baltimore is split with CSX on one side and NS on the other. Private guys use rail more on the other side. Don't know of any other private terminals outside of the coal terminal. Coal is the lion's share.*

Things are at a steady state now, and NS does a very good job of managing the window. The port has concerns as rail keeps growing - how much volume can NS handle? NS is boxed in at their yard so they only have so much room to store rail cars. If they can alleviate the window, that would help the storage issue at Bayview and get them moving as opposed to sitting there and taking up space. More throughputs on the corridor make it easier to get trains in and out.

13. **Question:** Of the rail freight coming and going to the yard, does all of NS freight come through by the Chesapeake Connector? Are there other routes into the port?

Response: *It depends on the port. I understand that NS comes from PA down along the Susquehanna into Perryville. For Baltimore, they would head south and would not traverse the Connector there. An impact could be felt if the window opens up and alleviates congestion, but this would be a secondary benefit of the Connector.*

14. **Question:** Does the port have plans to expand, which would create a need for more rail service? Short or long term?

Response: *Most of the expansion plans are on the other side of the harbor and wouldn't be affected by the Connector. There could be more for intermodal rail traffic. Seagirt Marine Terminal is the dedicated container terminal that CSX has leased. They are trying to build a new intermodal facility between Baltimore and Washington. Four sites have been selected and are in the NEPA process now. CSX could move to the new*

facility and vacate Seagirt. NS could come in when CSX switches locations, but that's a couple of years off and it can't happen until CSX vacates ICTS. Instead of trucking cars over they could have cars loaded there and switched to their Bayview facility. Whether that would increase business or not is uncertain. Can't do high speed double-stacked up corridor where they are now. Timing for that is years. CSX is working with MDOT and is going through the NEPA process for 4 sites. They're expected to finish NEPA likely within 9-12 months. Once that's completed and a site is selected, they could move in after 2 years. NS could add more cargo by having that yard available, but it depends what they want to do

Sussex County Economic Development

Description:

A conference call was held with Julie Wheatley, Director of Sussex County Economic Development, on December 7, 2011, to discuss the Chesapeake Connector project.

Attendees:

Sussex County Economic Development: Julie Wheatley

AECOM: Toni Horst, Carey Barr

Discussion of Delmarva Economy:

The project team explained that it has been conducting interviews with stakeholders and consulting data, and from the two the outlook for rail activity on the Delmarva appears to be limited. Rail data says carloads are dropping, though some of that is due to the recession. There appears to be a limited outlook for expansion. The hope is that Julie can provide a holistic look at the area for us.

1. **Question:** Are there any instances of businesses interested in moving to the area that ended up not doing so because of the lack of rail? Or are there any businesses that left because of the lack of rail access?

Response: *SPI Pharma in Lewes, DE (antacids) was shipping about 85 rail cars per year maybe. The state asked if they still needed rail, which nearly scared them away. [Indicates that without DelDOT investment in the rail near SPI Pharma, they would have not been able to continue business in the area.]*

Gardner-Gibson in Seaford, DE (black tar for roofing) brings material up by barge because of the limited access by rail, which was stamped 1890. They used to use rail as well, but does not use it any longer.

DelDOT is going to close a road which has connections for manufacturing, rather than repair it. They said the road wasn't being used, but it's not being used because it's washed out.

2. **Question:** Are there any opportunities on the Delmarva?

Response: *The aggregate industry has pending contracts. They want siding and are looking for a site and working with Norfolk Southern (NS), but they may have hit a dead end with NS. There is an opportunity from the car float and the rivers that have better access to the Delmarva with an influx of opportunity for rail freight.*

A plastics recycling company is looking at the area. It would take tons and bails of material by rail if it can get enough products, but is not ready to commit. The product is the black plastic under watermelons which normally is exported to China or Japan to be recycled, but could be done here. The state owns a spur from Milton to Ellendale, DE where propane/petroleum is expanding. Warehousing in Delaware is an opportunity because there is no inventory tax. Amazon is looking at Middletown, DE for a 1 million square-foot facility. The state arranged it. There is no opportunity for passenger rail due to lack of density, and also no opportunity for fresh goods because of the need for timeliness and refrigeration facilities.

3. **Question:** A lot of the industry discussed is, for lack of a better word, "dirtier," and the Delmarva is a very beautiful area. How do people balance it?

Response*: Well, I don't see it as dirty because "chicken manure smells like money," and the feed for chickens is our livelihood. Riprap helps fuel the construction industry, and having the recycling facility local is an opportunity. I see the rail industry as green, not as a detriment to the environment.*

4. **Question:** Are there any other issues we may have missed?

Response: *Shippers have mentioned back-haul opportunities. It would be more productive to ship*

cars one way and bring potatoes back, as an example. Not sure of any specific opportunities, but if back-haul were possible it would help the bottom line especially in the north.

Limestone has hit a dead end because you can't share sidings with it.

Not aware of any smaller producers who combine their products with other companies to get them on one train.

Poultry industry is looking to expand.

Packaged fruit industry is in southern New Jersey and Delaware looked at getting some of it, but the area wasn't near enough to I-95, and there is a lack of refrigeration facilities.

Follow Up:

Jim Wattington at Kent County Economic Development office may be able to provide some perspective on Kraft. (302) 678-3057

Delaware Department of Transportation

Description:

A meeting was held with Delaware Department of Transportation (DelDOT) personnel, on July 1, 2011, to discuss the Chesapeake Connector project. The meeting was held at DelDOT's office in Wilmington, DE.

Attendees:

DelDOT: David Campbell, Albert Loyola

AECOM: Toni Horst (via conference call), Sashank Singuluri

Meeting Part 1 (discussion of pre-developed questions):

Prior to the meeting, the project team submitted a series of questions to DelDOT for discussion at the meeting. A summary of that discussion is as follows:

1.Question: WILMAPCO, in 2003, studied the feasibility of extending of commuter rail service (SEPTA R2) from Newark, DE to Elkton, MD. Does SEPTA plan to extend its R2 service to Elkton, MD?

Response: *Questions 1. and 2. are fundamentally questions for SEPTA. With that caveat, I think it is very unlikely that SEPTA would extend service into Maryland. SEPTA's mandate in the legislation is to serve trips to, from, and within the five-county Philadelphia area. On this basis we can legitimately define service to Wilmington and Newark as part of SEPTA's mission — although I'm not sure everyone in SEPTA feels that way — but the further (from Philadelphia) out we go, or the more trips entirely outside Pennsylvania we serve, the less justification there is for SEPTA to do it.*

2. **Question:** If the third track were to be constructed, would SEPTA consider extending its service to Perryville, MD so as to be able to seamlessly connect to MARC service?

a. If so, do you believe that this third track will enable trains to save time, run faster, and be more reliable?

b. If so, please explain the reasons and provide any available quantification of travel times savings and reliability?

Response: *There are two options for the third track. A grade-separated freight track would have virtually no impact on passenger service. The two existing tracks are already freight-free during passenger operating hours. A third multi-use track would almost certainly benefit passenger operations, especially reliability/redundancy, but it would be difficult to quantify without technical analysis.*

3. **Question:** If SEPTA does not extend its Regional Wilmington / Newark line, do you believe that this third track will reduce cascading delays for its existing and future service?

a. If so, please explain the reasons and provide any available quantification of travel time savings and reliability?

Response*: If SEPTA does not extend service beyond Newark, it seems unlikely that a third track several miles beyond the end of the line would have significant impact.*

4. **Question:** Do you believe that this third track will reduce or eliminate conflicts with freight trains?

a. If so, please explain the reasons and provide any available quantification of the impacts of elimination of conflicts with freight traffic?

Response: *A written response was not provided; however, freight train traffic was discussed during the interview. A synopsis of the discussion is provided in following section.*

Meeting Part 2 (general conversation):

This meeting was conducted by Sashank Singuluri (AECOM). Albert Loyola (DelDOT) and David Campbell (DelDOT) participated in the discussion. Toni Horst (AECOM) attended the meeting via telephone.

Discussion of commuter rail

The state of Delaware does not have a rail transit system; however, DelDOT maintains a contract with SEPTA to provide service to Wilmington, DE and Newark, DE. SEPTA currently serves Delaware with thirty seven (37) trains a day to Wilmington, DE of which seventeen (17) are extended to Newark, DE during the peak periods. DelDOT bears the costs of operating the trains within the state of Delaware. DelDOT has identified a choke point and is planning to eliminate it by relocating the Newark station. Additional service to Newark is anticipated after this relocation. The relocation of the Newark station will — in addition — provide Norfolk Southern (NS) with additional capacity for its freight train service. The University of Delaware acquired the defunct Chrysler automobile factory and it is in favor of moving the station relocation. Maryland Transit Administration (MTA) has stated that *Maryland Area Regional Commuter* (MARC) might extend its service to Newark. The additional tracks and platforms that will be part of the new relocated station will aid in transfers between MARC and SEPTA. DelDOT is also looking into constructing storage tracks and is conducting a study for the same. These storage tracks will enable MARC to eliminate MARC deadheads to Baltimore, MD and Perryville, MD. The MARC service extension will bridge the service gap and provide commuters the ability to use commuter rail for longer distances. This service extension, however, will not compete with existing or future Amtrak service in the corridor since MARC/SEPTA and Amtrak serve different market segments. While Amtrak serves long distance commuters, MARC/SEPTA serve short distance commuters. The vision is to develop the vicinity of the Newark station into a transit oriented development (TOD) providing, and encouraging the residents in the area to increase the use of transit for most of their travel activities.

Discussion of freight rail

Most of the freight trains come into Newark through the port route. The closure of the Chrysler automobile factory has reduced freight traffic in the region. Fisker Automotive acquired the General Motors plant and plans to open its factory on 2012. Once the factory starts functioning, freight traffic in the region will increase. In addition, the state of Delaware approved the Bloom Energy factory that will start producing fuel cells. Once

this factory starts functioning, additional freight traffic will be generated in the region. These two factories will also create jobs and thus additional commuters along the corridor increasing commuter rail ridership in the region.

Freight traffic along the corridor is restricted; most of the freight trains traverse the corridor between 10:00 PM and 6:00 AM. Freight traffic through the region includes coal for the Indian River power plant, grain for poultry farms, and poultry. Some of the oil refineries in the region were recently closed. This has reduced freight traffic in the region.

MTA/MARC

Description:

A meeting was held with Maryland Transit Administration (MTA) personnel on November 21, 2011, to discuss the Chesapeake Connector project. The meeting was held at MTA's office in Baltimore, MD.

Attendees:

MTA: Ira Silverman, Harry Romano

AECOM: Toni Horst, Sashank Singuluri, Carey Barr

Meeting Part 1 (discussion of project background):

The meeting began with an overview of the project and estimated costs, as well as the team involved. The team mentioned that the underground option was originally considered, but the option was discarded before cost calculations were performed. Ira agreed that the underground option is infeasible. The main goal of meeting with Ira is to see whether there are benefits for passenger rail and the nature of them.

1. **Question:** Thus far, we are under the impression that MTA can run service without the improvement - therefore there would be no benefits.

Response: *Yes, MTA can run the service with the existing infrastructure.*

2. **Question:** How can you run service?

Response: *The current double track railroad (RR) accommodates 85-90 Amtrak trains per day and 58 Maryland Area Regional Commuter (MARC) trains through the tunnel, and New Carrollton on the double track RR. Amtrak operates 400 trains a day on the double-track into Penn Station. This is not ideal; they committed more than they should have. MTA never has all 58 trains operating on the segment and most of them traverse the segments south of Baltimore. If MTA can run 58 trains south of Baltimore, it should be feasible to run 58 trains north of Baltimore.*

The only additional capacity available is in the vicinity of stations where commuter trains may stop for Amtrak trains to overtake it. MARC trains use diesel locomotives and can achieve speeds around 100mph, so they're slower than Amtrak but not significantly. Drew Galloway at Amtrak asks for the ideal: 3 tracks. It probably can't be justified in the short term. The city of Elkton would like MARC to extend its commuter trains to Elkton: 5-6 trains each way to Elkton/Newark, which is more than able to be carried on the railroad. This extension would cause conflicts with existing freight service in the region. They believe the region south of Perryville is in the same situation. Supporters of a southern extension suggest a stop in North East near the Bacon Interlocking. The key variable is the location of the station, which is not known yet. One of the possible locations is on the double track. North East station was mentioned politically and would be on double track which could cause a bottleneck. It is possible that the city of Elkton may have received incomplete or incorrect information that was the basis of some of these concepts. I do not want to say it will happen, but it should certainly be mentioned as something that could drive that. Would they just need the 3rd track for a mile? Sure, but that doesn't justify the entire six mile Chesapeake Connector.

3. **Question:** Is there a schedule for long-range service?

Response*: The Master Plan describes it in words. The schedule which includes ½ hour service in Newark and hourly service in the off-peak, can handle doubling of MARC ridership. Separate tracks for Amtrak and MARC and freight trains from Newark to DC are assumed in the Master Plan. We will send you an excel spreadsheet with the schedule.*

Mr. Silverman sent the schedule and the same is provided as an attachment.

4. **Question:** If the 3rd track is built reliability would increase; how long would the average wait for your trains be if the 3rd track wasn't built? With population increases, Amtrak will probably increase service. Would this increase in Amtrak service cause MTA trains to be delayed more frequently and decrease reliability?

Response: *The delays would be about 10 minutes. The southbound high speed track is track #3.*

The Chesapeake Connector would definitely increase reliability; however, the northbound trains are the ones with the conflict.

5. **Question:** Does the proposed bridge project change the amount of traffic?

Response: *The amount of traffic would not change; however, it would be designed to increase the speed (90 vs. 120 mph), will add capacity, and separate freight and commuter from Amtrak. 4 tracks from Perryville to Baltimore is in Amtrak's Master Plan.*

6. **Question:** Do you conduct customer satisfaction surveys? How do they react to delays?

Response: *We do not conduct customer satisfaction surveys frequently. On-time performance is a very important factor, but it is important to consider the number of people on these trains — maybe 50 on a train — which is low. MTA works closely with Amtrak to avoid scheduling conflicts and to ensure that both Amtrak and MARC trains adhere to the schedule. It takes 3-4 minutes for an overtake. If Acela trains are late, MARC trains wait for them to overtake. Everyone wants the trains on time and it's a strong goal but it is important to compare the travel time improvements to the costs. The Growth and Investment Plan allocated $3.5 billion and MTA is spending $200-300M per year, mostly on equipment. The Chesapeake connector will improve reliability for a relatively small number of people.*

7. **Question:** In the case of bad weather delays, what would change?

Response: *If there's a 3rd track or not, there will still be a delay the same as for the 2 existing tracks. There would still be delays, but perhaps not as long as they would have been. The ideal scenario for MARC would be 4 tracks each way, but for the foreseeable future there are very few trains there.*

Meeting Part 2 (general conversation):

Discussion of commuter rail

At some level the extra capacity will be valuable, but MTA is not sure at what combination of Amtrak MARC service, the extra capacity would be really valuable. Amtrak will be conducting a programmatic EIS of the NEC with simulations of schedules, but in the plan they assume 3 tracks the whole way.

From an operations perspective, Wilmington is not the best place to reverse a train. The more service for Amtrak and MARC, the more desirable the track is. It is not constrained by capacity in the short term (15-20

years). Most studies have suggested that the two existing SEPTA trains be extended southwards -one midday and one in the evening. Amtrak's simulation model is capable of simulating this service to study and plan for operational issues. MTA does not foresee any operational and scheduling issues north of Perryville if Amtrak and MARC trains are 10-12 minutes apart.

It is not feasible to construct the North East station on the double track; a third track would be necessary near the station. It is important to note that the platform needs to comply with the American Disabilities Act (ADA) and would require a high level platform.

There are many other places that — financially — are a higher priority. MTA is concentrating its efforts on light rail projects. The 2007 Master Plan was finalized; however, the recession reduced available funding. The 2007 Master Plan is available on the MTA website.

If northbound trains are a little late, MARC trains will wait 5-7 minutes for Acela to pass them. This is not desirable, but it's fairly frequent. A platform is desirable, not essential.

The state has a grant from the DOT to study Environmental Impact (EI) and Preliminary Engineering (PE) on a new bridge at Perryville. This bridge is assumed to be a second double-track bridge. Once this bridge is constructed, the existing bridge will probably be used for freight and commuters. Amtrak has conceptualized this idea.

Mr. Silverman is positive that this concept has an overpass as part of the bridge which passes over the freight rail track. It can potentially be said that the overpass isn't completely attributable to the Chesapeake Connector project, which would change the costs. Mr. Silverman recommended that the team discuss this further with Drew Galloway at Amtrak.

To summarize, MTA doesn't see the benefit of the third track. MTA believes that it would be beneficial to improve infrastructure south of Perryville.

Mr. Silverman said he would send the Newark station feasibility report. He sent the report which is provided as an attachment. A station at Newark might reduce deadheads and could be used to store trains overnight. The state of Delaware has expressed a desire for service to Newark and a yard there. There is, however, no need for the third track to benefit from the deadheads.

MTA never contended they needed the third track, but they do need the station at Elkton and a place to turn the trains around.

In 25 years population is projected to be up by 25% in the region and a comparable increase in employment is projected. MARC trains have enough additional seating capacity to be able to serve commuters even with this increase in population and employment. It is also important to note that though population is projected to increase, ridership is not projected to increase at the same rate. It would be more beneficial to allocate available resources to construct overpasses so that northbound and southbound trains could cross over, thus improving operations and reliability.

Discussion of freight rail

Norfolk Southern (NS) wants more access in the region of interest; it is more constricting that they cannot operate freely up there. Although popular opinion is that they are not allowed during the day, that's not true; they operate at 30 mph during the day. The trains traversing this corridor are one manifest train which continues to Harrington, two or three coal trains, and empty trains. It is not a lot of trains to be making a huge investment for. They have a problem that they are restricted during the middle of the day so they are on and off in the middle of the night. It does not seem like a lot of trains for that level of investment. NS cannot pay for it. There are some benefits if NS detaches it from the cost liability issue.

DelDOT mentioned reopening a refinery which might add some more freight which is currently mostly coal, and poultry feed (Purdue). The state owns two short lines that connect to NS. The primary business is harvesting soy beans and transporting them to Norfolk to export to Europe.

There has been a decrease in manifest trains with the closing of the Chrysler plant. More track would certainly help, it is just not the best place to spend a large amount of money.

NS was the driving force for this project. They convinced the city of Elkton that it is essential in order to have service to Elkton. Delaware would like to improve freight service, and they believe the Chesapeake Connector will help provide commuter service quicker. This study is being conducted to try and quantify the benefits. There are benefits, but some - if not all - of the benefits cannot be directly quantified. Most of the benefits are secondary and accrue from improvements to reliability, etc. NS is concerned that it would have to bear the costs and it made the case that while initially MARC and Amtrak will and can coexist, with projections the present two tracks will not be sufficient and if you go beyond a certain level, the third track is essential. Carloads on the Eastern Shore have reduced from 60,000 to 40,000. It is not the growth part of their business.

Wilmington Area Planning Council

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RESOLUTION

BY THE WILMINGTON AREA PLANNING COUNCIL (WILMAPCO) ENDORSING THE CHESAPEAKE CONNECTOR ECONOMIC BENEFITS STUDY

WHEREAS, the Wilmington Area Planning Council (WILMAPCO) has been designated the MPO for Cecil County, MD and New Castle County, DE by the Governors of Maryland and Delaware respectively; and

WHEREAS, the 6.3 mile section of Amtrak's Northeast Corridor (NEC) between Prince interlocking in Perryville, MD and Bacon interlocking in Northeast, MD is the only two-track section of the NEC in the WILMAPCO region; and

WHEREAS, Regional freight rail movements are impeded by this two-track bottleneck; and

WHEREAS, the efficient movement of freight via rail is of prime importance to the continued economic viability of business and industry in the WILMAPCO region; and

WHEREAS, DelDOT, and MDOT have asked WILMAPCO to complete a study to show the cost for and benefits of adding a third track to the NEC from Perryville to North East, Maryland; and

WHEREAS, the Chesapeake Connector Economic Benefits Study has generated a set of Alternatives with cost estimates that utilize the Federal Transit Administration's (FTA) Standard Cost Category (SCC) system; and

WHEREAS, the Study has undergone the appropriate technical review from the project Advisory Committee and the WILMAPCO TAC;

NOW, THEREFORE, BE IT RESOLVED that the Wilmington Area Planning Council endorses the Chesapeake Connector Economic Benefits Study.

5-13-14
Date:

Joseph L. Fisona
Joseph Fisona, Chairperson
Wilmington Area Planning Council