Western Virginia Intermodal Facility: Economic and Transportation Impacts Study

Final Report

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Roanoke Valley-Alleghany Regional Commission,
in Partnership with the Commonwealth's Office of
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LIST OF EXHIBITS

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Executive Summary

The development of a Western Virginia Intermodal Facility near the intersection of two major Norfolk Southern (NS) freight corridors (Heartland and Crescent) is a project with a complex history. The following briefly summarizes the history and the changed conditions that warranted the reexamination of the project and its potential impacts.

- An initial look at the feasibility of an intermodal facility in Western Virginia was taken as part of the *Roanoke Valley - Alleghany Regional Freight Study Final Report* (Wilbur Smith, 2003), which indicated that the facility was not feasible at that time due to the unbalanced freight flows in the region (higher volumes of outgoing containerized freight than incoming).
- Virginia Department of Rail and Public Transportation (DRPT) undertook a new study to evaluate a Western Virginia Intermodal Facility in 2008 that included an economic assessment of the potential economic impacts (jobs, output, and tax revenues) and identified the potential public benefits of an intermodal facility in the Western Virginia region (not site specific) and the Heartland Corridor between a facility and Norfolk. The benefits of the Heartland Corridor and the intermodal facility were estimated to pay for the investment after five years, though the return on investment of the intermodal facility alone was not presented. As part of this study, DRPT also evaluated ten potential sites in the Western Virginia region and ultimately resulted in the selection of the Elliston site in eastern Montgomery County.
- With the DRPT recommendation of the Elliston site in place, further development of the intermodal facility was delayed due to a legal challenge by Montgomery County on the constitutionality of the state funding 70% of the original facility cost.[1]
- The Virginia Supreme Court ruled in 2011 that the state funding plan was constitutional due to its ability to increase capacity along I-81; the project cleared its legal hurdles but faced new economic struggles. The economic recession's impacts on freight movements and NS's market condition created a difficult environment in which to implement a new intermodal facility in the region. As a result, the Western Virginia Intermodal Facility development was delayed and continues to be today.

Since the last Western Virginia Intermodal Facility studies were completed, the economic and freight conditions surrounding the facility have continued to evolve, painting a different context for the intermodal facility than has been studied previously. Some of the most notable changes include:

- **Economic recession**: The economic recession significantly impacted freight movements and NS business through weakened private and public investment, as well as decreased freight demand.
- **Crescent Corridor**: The facility is also located along NS's Crescent Corridor, which has seen a $2.5 billion investment to improve speeds of freight movements and includes the introduction of four new terminal facilities.
- **Heartland Corridor**: The Heartland Corridor is fully operational. As a result, estimates of container traffic growth for the facility can be revisited in light of actual experience.
- **Growth at the Port of Virginia**: The Panama Canal expansion improvements are much closer to planned completion (2015), increasing the likelihood that the largest container ships serving Asia will call on eastern U.S. ports. The increased cargo traffic through the Port of Virginia (Port) could result in higher traffic volumes at inland intermodal facilities.
- **Competing intermodal facilities**: Previously assumed to be constructed after the Western Virginia facility, the Prichard facility in West Virginia broke ground in 2013, making it operational before the Western Virginia facility. In light of this development, estimates of container growth and potential users of the Western Virginia Intermodal Facility will need to be revisited in order to assess whether and how competing facilities affect the necessity of a facility in Western Virginia.
- **Growing emphasis on national freight corridors**: With the passage of Moving Ahead for Progress in the 21st Century (MAP-21) in 2012, the federal government has placed a larger emphasis on improving the condition and performance of the national highway freight network and supporting investment in freight-related surface transportation projects. The Western Virginia Intermodal Facility

[1] The remaining 30% would be paid by Norfolk Southern or another intermodal operator.

is located along a portion of I-81 that is included in the proposed federal Priority Freight Network (PFN). As a result, the movement of highway freight is going to continue to grow in this region and along the PFN corridor. The intermodal facility could help alleviate congestion and increase capacity along the I-81 PFN in the Western Virginia region by diverting freight to rail.

Due to these evolving conditions, this study evaluated what has changed and what remains true from the previous studies, and determined whether the Western Virginia Intermodal Facility is still economically viable. In addition, this study assessed the intermodal facility's market feasibility by considering potential users and their utilization of the facility, issues and factors that may affect the use of the facility or create obstacles to its market feasibility, economic impacts on the broader community (both positive and negative), and whether the potential return on investment for the facility supports the investment in light of today's economic and logistics conditions.

This study evaluated what has changed and what remains true from the previous studies, and under what range of conditions the Western Virginia Intermodal Facility is economically viable.

Stakeholder Outreach

Focused discussions with industry stakeholders was a key component in identifying specific companies that have current and projected needs for an intermodal facility, as well as issues and factors that may affect the use of the facility or create obstacles to its market feasibility. In order to gain this understanding, the team used an interactive process to involve regional planners and key freight stakeholders throughout the development of the study. The information obtained from shippers and industry representatives was critical to accomplishing the objectives of this study. A total of five workshops were conducted in Roanoke, and there were a number of findings that were consistent across the five groups. These findings can be broadly broken down into four topics: facility, competition, risk, and economic growth.

Facility. Respondents felt that a number of features were needed at the facility in order for it to function well, including: parking along the access roads for trucks waiting outside of the gate; container storage; a container pool; chassis storage; tires, breaks, and truck repair services; and a 24-hour facility. Suggestions of who might operate the facility ranged from NS to the Port of Virginia or a third party economic development agency.

Competition. Competition came into play in two ways – pricing and distance. With the intermodal facility in place, there is concern that shippers will have the choice of using NS or paying to dray to CSX. The opportunity for the facility to serve both the Crescent and Heartland Corridors could increase the competition for long-haul truckers. The long-haul trucking industry could be pushed out if rail pricing is better, but the facility would provide an opportunity for more competition in the shorter dray trucking industry. The trucking industry is moving from longer hauls to shorter hauls due to lifestyle changes of drivers and hours of service restrictions, the existing pool of long-haul truckers is aging rapidly, and there will soon be a driver shortage. Finally, rail is typically competitive with truck for distances of approximately 500 miles[2] or more, so trucking to the Port will remain the most viable mode outside of subsidies and large concentrated volumes. However, rail can be more competitive for goods to and from Western Virginia and the rest of the western U.S., if there is a market.

Risk. The risk of building or not building the facility was discussed, as well as the risk of further conflict with Montgomery County. Stakeholders believe that NS will not build the facility unless there is market demand, and the lack of the facility is an indicator of the demand in the region. NS may have a disincentive to build the facility because of the performance measures that are in place once it opens for business, and the risk of having to pay back a portion of the state's capital funding is enough to keep NS from building the facility. The nearby highways are not going to be finished until 2016, which could also

[2] The range varies, but 500 miles is a common rule of thumb.

be discouraging businesses from locating in the region. Putting goods on rail to or from the Port is a reliability risk because rail takes longer than truck. As a result, rail is only a viable mode for goods that are not time sensitive. Finally, there are risks of continued conflicts with Montgomery County. The past litigation between the county and the state effectively halted construction and caused NS to reconsider locating a facility in such a contentious location. While Montgomery County may get the physical facility, another county could get the ancillary buildings and complementary services due to the lack of properly zoned land and adjacent sites. This is of concern to Montgomery County because they would have assumed the environmental and traffic risks of the facility, while the majority of the tax benefits locate in adjacent counties.

Economic Growth. The economic growth that could be attracted is largely associated with the type of facility and ancillary businesses that would come, but respondents felt that the volumes could grow like they have at other intermodal facilities like Greensboro, Front Royal, or Greencastle. With the Western Virginia region having a smaller market compared to the market serving Front Royal, it will likely attract fewer companies. Depending on the volumes from the Panama Canal opening, the Port may need some help with sorting and distributing containers and the Western Virginia region could fill that need.

In addition to the workshops, interviews were conducted to understand the potential market and outlook for an intermodal facility in the Western Virginia region. The interviews were an opportunity to speak directly with stakeholders about their specific needs and the facility's outlook in a more personalized setting. A total of eight interviews were conducted for the study in-person or through conference calls, and the main takeaways from the interviews are consistent with those from the workshops.

Four market scenarios were developed to analyze varying volumes of usage, costs, and revenues.

Scenarios Analyzed

Four market scenarios were developed to analyze varying volumes of usage, costs, and revenues that could occur at the Western Virginia Intermodal Facility. The assumptions used to develop the scenarios are based on existing freight flows in the region, as described at the workshops and interviews, and feedback from attendees at a Market Scenarios Workshop. The four scenarios range from a high demand and high growth scenario (Scenario 1) to a low volume and low growth scenario (Scenario 4) with two scenarios at points between. The variables are quantified in terms of the markets it serves, the volumes it handles, and the rate of growth affecting volumes.

A number of the facility benefits quantified in later sections are based on trucking route assumptions. These benefits all depend on the vehicle miles traveled (VMT) that are avoided when trucks no longer have to make trips from the Western Virginia region to the next nearest intermodal facility. The assumption of these benefits is that the trucks drive goods to the nearest facility, where the goods are transferred to rail for movement to the final destination.

Scenario 1: Most Optimistic

In the best case scenario, the 2019 Base Case volume is expected to represent 20% of the market captured by the facility. In addition, this scenario assumes that the facility functions as an interchange for traffic on both the Heartland and Crescent Corridors[3]. The Crescent Corridor volumes were estimated in the same manner as those using the Heartland: from stakeholder input. This results in 4,956 TEUs in the Base Case in 2014, and escalated at 2% per year to 2019 results in 5,476 TEUs. In total for Scenario 1, the Base Case estimates 14,929 TEUs in 2019, resulting in a utilization of approximately 50%. Pivoting off of the Market Scenario assumption that the Base Case represents 20% of the market captured by the facility, Scenario 1 results in a utilization of over twice what the facility can handle. As a result, the volumes are capped at 30,000 TEUs. The volumes for Scenario 1 begin at 30,000 TEUs (or 15,000 40-

[3] Norfolk Southern has indicated that they have no intention of operating the facility as an interchange between the two Corridors, but this analysis attempts to quantify the volumes they could capture if it were operated in that way.

foot containers) and remain there for the entire analysis period, because the facility is assumed to be able to handle 15,000 lifts. The VMT avoided remains at approximately 3.5 million per year throughout the analysis period.

Scenario 2: Optimistic

Scenario 2 assumes that the Base Case volumes in 2019 represent 40% of the facility's market capture. Only Heartland Corridor traffic is considered. In addition, the scenario assumes that the facility is able to capture 5,000 TEUs from nearby intermodal facilities like Greensboro and/or Prichard. As a result, the facility handles 28,630 TEUs in 2019, representing 95% utilization. The growth rate of volumes in Scenario 2 is half that of Scenario 1, resulting in a compound annual growth rate (CAGR) of approximately 1% per year. Because the facility is assumed to handle 15,000 lifts per year, the facility reaches capacity in 2024, and the volume is held constant throughout the remainder of the analysis period. The VMT avoided ranges from 3.5 million in 2019 to 3.7 million in 2048.

Scenario 3: Pessimistic

Scenario 3 assumes that the Base Case volumes in 2019 represent 60% of the facility's market capture. Only Heartland Corridor traffic is considered. In addition, the scenario assumes that the facility is able to capture 5,000 TEUs from nearby intermodal facilities like Greensboro and/or Prichard. As a result, the facility handles 20,753 TEUs in 2019, representing 69% utilization. The growth rate of volumes in Scenario 3 is half that of Scenario 1 (and equal to the rate in Scenario 2), resulting in a CAGR of approximately 1% per year. The facility reaches 92% capacity by the end of the analysis period. The VMT avoided ranges from 2.5 million in 2019 to 3.4 million in 2048.

Scenario 4: Most Pessimistic

Scenario 4 assumes that the Base Case volumes in 2019 represent 80% of the facility's market capture. Only Heartland Corridor traffic is considered. As a result, the facility handles 11,815 TEUs in 2019, representing 39% utilization. The growth rate of volumes in Scenario 4 is half that of Scenarios 2 and 3, resulting in a CAGR of approximately 0.50% per year. The facility reaches 46% capacity by the end of the analysis period. The VMT avoided ranges from 1.4 million in 2019 to 1.7 million in 2048.

Operating Costs and Revenues

Analyzing the four scenarios as described above resulted in conclusions illustrated as benefit cost ratios (BCRs) and revenue to cost ratios (R/C). BCRs aggregate the total benefits and compare them to the total costs of the project for the four scenarios. Alternately, R/C ratios compare a subset of those benefits and costs in an effort to demonstrate different estimates of profitability. A number of iterations of BCRs and R/C ratios were estimated for the four scenarios at five discount rates and are displayed in this report.

From the perspective of the facility owner, the R/C ratios show that the facility more than covers the operating costs over the analysis period at all discount rates and for all scenarios.

From the perspective of the facility owner, the R/C ratio compares the revenues generated by the lift fees to the individual cost components. The R/C ratios displayed below show that the facility more than covers the operating costs over the analysis period at all discount rates and for all scenarios. Scenarios 1 and 2 have annual operating costs of $750,000, while Scenarios 3 and 4 are $500,000 annually. As a result of the R/C ratios for all four scenarios being above 1.0, the facility can operate and generate sufficient revenue that in turn can be used to pay back the capital costs of the facility's construction. These results show that the operation of a facility could possibly be contracted out or negotiated through a public private partnership (P3).

Exhibit 1: R/C Ratios of Lift Fee Revenues to Operating Costs for Scenarios 1-4

	30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic					
O&M Cost	$7.10	$8.18	$9.49	$11.09	$13.06
Lift Fee Revenues	$12.78	$14.72	$17.07	$19.95	$23.51
Scenario 1 R/C Ratio	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**
Scenario 2: Identified Shippers Represent 40% of Market, Optimistic					
O&M Cost	$7.10	$8.18	$9.49	$11.09	$13.06
Lift Fee Revenues	$12.66	$14.60	$16.94	$19.82	$23.36
Scenario 2 R/C Ratio	**1.78**	**1.78**	**1.79**	**1.79**	**1.79**
Scenario 3: Identified Shippers Represent 60% of Market, Pessimistic					
O&M Cost	$4.73	$5.45	$6.32	$7.39	$8.71
Lift Fee Revenues	$9.78	$11.33	$13.23	$15.56	$18.47
Scenario 3 R/C Ratio	**2.07**	**2.08**	**2.09**	**2.11**	**2.12**
Scenario 4: Identified Shippers Represent 80% of Market, Most Pessimistic					
O&M Cost	$4.73	$5.45	$6.32	$7.39	$8.71
Lift Fee Revenues	$5.29	$6.11	$7.11	$8.34	$9.86
Scenario 4 R/C Ratio	**1.12**	**1.12**	**1.12**	**1.13**	**1.13**

Source: AECOM

Although the facility can cover its operating costs with the lift fee revenues, the total costs are not covered by the total benefits in most cases. As a result, the analysis considered whether the facility costs could be reduced. In fact, it appears that the 65 acre facility has more than enough space to handle the 15,000 lifts per year, and as a result the analysis investigated whether reducing the facility size to cover a smaller acreage could reduce capital costs and thereby result in higher BCRs.

It is possible to handle significantly more than 15,000 lifts using a smaller footprint, thereby reducing initial capital costs.

Alternate Facility Design

The scale of the facility affects the capital costs associated with the site development. The 65-acre site may be larger than necessary for the 15,000 lift per year operation that is planned. Preparing and paving such a large acreage is contributing to a portion of the capital costs and those costs could be avoided if the site only prepared and paved the portion of land that is needed for the actual operation and storage. By reducing the scale of the facility from 65 acres to cover only the acreage needed, capital costs of the facility construction decrease; and as a result, the benefit cost ratios will increase to make the project more financially feasible for the owner/operator.

An analysis was done considering the space constraints and operations at a typical intermodal facility. Using an operational “rule of thumb” that a facility can handle approximately 4,000 lifts per acre per year, as well as the space for the lead track and other operations, an alternate cost estimate considered how the site might more effectively be used. The estimate considers the cost of a facility in the same location but with a reduction of the paved area from 65 acres to approximately 51.5 acres, still allowing for plenty

of space for parking and storage. In addition, the space could theoretically handle 100,000 lifts per year, assuming that 25 acres are used for the actual facility and the remaining acreage is paved for other uses. The 4,000 lifts per acre assumption comes from industry experience and falls within the range of 2,000[4] to 5,400[5] lifts per acre for intermodal facilities used in other research. In reducing the paved area, the capital cost of the facility is reduced to approximately $70.9 million, a savings of $6.68 million by just reducing pavement space. From a total economic perspective, this reduced cost results in the BCRs of Scenarios 1 and 2 becoming greater than 1.0 at the 4% discount rate, whereas at the full capital cost only the 3% discount rate resulted in BCRs above 1.0. The BCRs for Scenarios 1 and 2 under the reduced facility cost are shown in **Exhibit 2**.

Exhibit 2: BCRs for Scenarios 1 and 2 under Reduced Facility Cost ($70.9M)

	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic					
Capital Cost	$51.84	$52.67	$53.38	$53.93	$54.25
Total Benefits	$35.88	$41.23	$47.82	$56.02	$66.31
Scenario 1 BC Ratio	**0.69**	**0.78**	**0.90**	**1.04**	**1.22**
Scenario 2: Identified Shippers Represent 40% of Market, Optimistic					
Capital Cost	$51.96	$52.79	$53.51	$54.07	$54.40
Total Benefits	$37.27	$42.84	$49.70	$58.23	$68.93
Scenario 2 BC Ratio	**0.72**	**0.81**	**0.93**	**1.08**	**1.27**

Source: AECOM

Taken one step further, the analysis considered the minimum size necessary for the facility to operate at full capacity (15,000 lifts per year). Because the design and operating plans of the site are not finalized, and because the degree of uncertainty increases with lower volumes, the rule of thumb of 4,000 lifts per acre was reduced to 3,000 lifts per acre and a contingency of 50% was added. Using these assumptions, the facility could theoretically handle the 15,000 lifts per year on eight acres.

In addition, the analysis considered the minimum acreage necessary for the facility to operate at Scenario 1's full capacity with when the lift cap was removed (resulting in 66,000 lifts per year). At the higher volume of lifts per year the rule of thumb of 4,000 lifts per acre was deemed more appropriate and used a contingency of 20%. Using these assumptions, the minimum footprint needed to accommodate 66,000 lifts per year is approximately 20 acres. NS already owns 43 acres at the Elliston location and could theoretically operate the facility on the single largest parcel that totals 22 acres. Reducing the facility footprint would reduce the overall cost of the facility[6], and could also reduce the annual operating expenses.

While this analysis illustrates that reducing the paved space would save millions in capital costs, the analysis also shows that there are a number of fixed costs associated with the intermodal facility for proper operations that cannot be avoided regardless of lift capacity. Recent trends have shown that

[4] 2,000 lifts per acre per year from the Midwest Regional University Transportation Center's report on the Twin Ports Intermodal Freight Terminal Study, July 15, 2003. http://www.dot.state.mn.us/ofrw/PDF/Twin%20Ports%20Intmdl%20Terminal%20Study%20-%20FINAL.pdf

[5] 5,400 lifts per acre per year from HDR WHI Report on Comparative Analysis of a Multi-Use Rail Served Port Facility, October 6, 2009. https://www.portlandoregon.gov/bps/article/279955

[6] The cost savings of these scaled-down facilities are difficult to estimate without more information on the site layout and operations.

intermodal facilities tend to have greater lift capacities and to be located in areas with greater demand due to the significant fixed costs associated with building an intermodal facility. Because the lift capacity of the facility is based on market demand in the region, it is unlikely that the facility would be constructed at that size. Another option to consider that could reduce the capital costs is the necessity of rebuilding and relocating Cove Hollow Road and the associated bridge. It would be advantageous to investigate whether and how those investments could be avoided or constructed in a manner that would reduce the costs as well as the impacts to the natural environment, if possible.

Necessity of Capital Subsidies

Currently, a capital subsidy of $25 million is dedicated to the facility's construction from the Virginia Department of Transportation (VDOT). If the Commonwealth were to offer an additional capital subsidy for the facility, then an operator would be more willing to take on the risk of meeting the performance measures as stipulated in the agreement between the state and NS. This would not be the only facility to require a capital subsidy to get constructed. Some of Western Virginia's nearest competitor facilities, listed in **Exhibit 3**, also required subsidies from the public sector in order to get the facility constructed. As a result, the necessity of an additional subsidy is not unique to the Western Virginia Intermodal Facility and should not be considered the facility's largest impediment, but instead one of the challenges that can more easily be solved through a TIGER grant or other such source.

The necessity of an additional subsidy is not unique to the Western Virginia Intermodal Facility and should not be considered the facility's largest impediment, but instead one of the challenges that can more easily be solved, as public funds have been used for Greer, SC and Greencastle, PA.

Exhibit 3: Capital Subsidies for Intermodal Facilities

Facility	Opening Year	Total Cost	Subsidies
Virginia Inland Port	1989	$13 million[1]	$13 million paid by state of Virginia[1]
Greencastle Intermodal Facility	2013	$97 million[2]	$45 million paid by state of Pennsylvania[2]
Charlotte Intermodal Facility	2013	$104.1 million ($94.4 for intermodal facility; $9.7 million for public road construction)[3]	$14.1 million from SAFETEA-LU $25 million requested from a TIGER Discretionary Grant $2.8 million from North Carolina Department of Transportation $4.0 million from the City of Charlotte[3]
Greer	2013	$51 million	$43.5 million from South Carolina Ports Authority[4]

Sources:
(1) Tioga Group, Inland Port Feasibility Study, August 2008, http://tiogagroup.com/docs/Tioga_Grp_SCAGInlandPortReport.pdf
(2) Charlotte Chamber of Commerce, The Charlotte Regional Intermodal Facility Presentation, April 16, 2010, http://charlottechamber.com/clientuploads/2010TransportationSummit/Darrell.pdf
(3) Cappuccio, Lauren, "Officials dedicate Franklin County Regional Intermodal Facility," Public Opinion, June 12, 2013, http://www.publicopinionline.com/ci_23438867/officials-dedicate-franklin-county-regional-intermodal-facility
(4) Leach, Peter T, "Michelin Plant to Drive Tire Volumes Through Charleston," Journal of Commerce, January 28, 2014, http://www.joc.com/port-news/us-ports/port-charleston/michelin-plant-drive-tire-volumes-through-charleston_20140128.html

As the scenarios stand now, Scenarios 1 and 2 offer benefit cost ratios of greater than 1.0 under a 3% discount rate from the Commonwealth's perspective. From an operator's perspective, large capital subsidies will be needed to construct the facility as it is designed to date. The subsidies needed for the facility owner/operator to reach an R/C ratio of 1.0 at a 7% discount rate for each scenario are displayed in **Exhibit 4** below. When the lift cap of 15,000 is removed, Scenario 1 grows to over 66,000 lifts per year by the end of the analysis period and would only need an additional subsidy of $16.3 million because of the revenues generated by the lift fees.

Exhibit 4: Capital Subsidy Required for Scenarios 1-4, Excluding Residual

	Total Subsidy Required (includes $25M already dedicated) to reach R/C Ratio of 1.0 at 7% discount rate, $M	Additional Subsidy With Lift Cap (excludes $25M already dedicated), $M	Additional Subsidy Without Lift Cap (excludes $25M already dedicated), $M
Scenario 1: Most Optimistic	$ 71.0	$ 46.0	$ 16.3
Scenario 2: Optimistic	$ 71.1	$ 46.1	$ 45.0
Scenario 3: Pessimistic	$ 71.7	$ 46.7	$ 46.7
Scenario 4: Most Pessimistic	$ 77.3	$ 52.3	$ 52.3

Source: AECOM

Economic Impact

Besides providing a revenue stream for the operator, the facility would result in wider economic impacts for the Western Virginia region, including employment and wages. The project will primarily draw employees and supplies from the Roanoke Metropolitan Statistical Area (MSA), which is considered for the job creation analysis. The Roanoke MSA includes Botetourt, Craig, Franklin, Roanoke, and Salem counties in Virginia, in addition to the City of Roanoke. Additional employment could come from adjacent MSAs including Blacksburg-Christiansburg-Radford[7], Danville, and Lynchburg, though the construction impacts quantified here only consider the Roanoke MSA.

Construction of the project is estimated to support 887 job years.

The construction of the project represents a large capital investment in the regional economy. This spending will increase employment and earnings in the region for the duration of the construction process. As seen in **Exhibit 5**, construction of the project is estimated to support or create over 887 jobs of one year's duration, including 361 direct construction and 130 direct professional services job years. A job for one person that lasts three years would be equivalent to three person year jobs. These jobs are temporary; they last for the duration of the construction period, ramping up and down with the construction cycle[8].

Exhibit 5: Annual Construction Expenditures and Direct Earnings Created in the Roanoke MSA (2014 $M)

	2016	2017	2018	Total
Total Expenditures ($M)	$ 6.83	$ 47.83	$ 13.67	$ 68.33
Direct Employment: Construction (job years)	36	252	72	361
Direct Employment: Professional Services (job years)	13	91	26	130
Total Earnings: Construction ($M)	$ 2.77	$ 19.40	$ 5.54	$ 27.71
Total Earnings: Professional Services ($M)	$ 1.41	$ 9.88	$ 2.82	$ 14.11
Total Employment: Construction (job years)	64	449	128	641
Total Employment: Professional Services (job years)	25	172	49	246

Note: Sums may not equal totals due to rounding
Source: AECOM analysis using RIMS II multipliers and monthly Project costs based on $77.53 million facility

Potential Additional Development Impacts

In an effort to estimate the adjacent development that could occur as a result of the intermodal facility, the growth around NS's Greencastle intermodal facility was analyzed. Construction was completed on the Greencastle facility in 2013, and in the years prior the Franklin County Area Development Corporation (FCADC) released business expansions and announcements through their annual reports. Counties around the Western Virginia Intermodal Facility could anticipate similar announcements and adjacent development as a result of the construction.

[7] The Blacksburg-Christiansburg-Radford MSA encompasses Giles, Montgomery, and Pulaski Counties and the City of Radford.

[8] The economic impacts from the construction of the Project are estimated for the Roanoke, VA MSA based on the construction and professional services expenditures and the construction and professional services RIMS II multipliers for the region. The Final Demand construction RIMS II multipliers are 0.5941 (earnings) and 14.5482 (employment) for the region. The Final Demand professional services RIMS II multipliers are 0.6506 (earnings) and 12.1175 (employment). Please note that to use the final demand multipliers for employment, the costs were deflated to 2010 dollars using GDP deflators because the RIMS II multipliers are based on 2010 data.

Considering the differences between the Greencastle and the Western Virginia facilities and locations, an upper bound of employment and development impacts was developed. Announcements with square footage and new employment estimates were averaged to produce an estimated employment per square foot of 1,942. In other words, every 1,942 square feet a business constructs or leases results in approximately one new employee. In total, approximately 3.7 million square feet were announced, and if the average holds true, approximately 1,905 new jobs resulted from those announcements.

Based on similar facilities, up to 636 jobs could be attracted in the first three years of operation.

As an upper bound, the analysis assumes that the Western Virginia Intermodal Facility would function in a similar manner as Greencastle in terms of attracting new and expanding businesses, but scaled to the annual lift capacity of the Elliston site. At 15,000 annual lifts, the Western Virginia Intermodal Facility would operate at 17.6% of Greencastle's capacity, which would imply that the Western Virginia region could attract up to 650,000 square feet of new development. Using the same employees per square foot of development as Greencastle, this would result in approximately 330 direct recurring jobs.

To determine the total number of jobs that could be generated from this upper bound scenario, it is assumed that the direct jobs would be equally split between warehouse/storage, truck transportation, and manufacturing industries in the Roanoke MSA. As with the construction impacts, employment could come from other adjacent MSAs in addition to those from the Roanoke MSA quantified below. These direct jobs would result in indirect (due to the additional final demand created in industries that support the warehouse/storage, truck transportation, and manufacturing) and induced employment (from the additional final demand created from the household spending of people directly and indirectly employed from the development) in the Roanoke MSA[9]. The potential total employment impact for the upper bound scenario is shown below in **Exhibit 6**.

Exhibit 6: Upper Bound Potential for Employment Gains from Development Attracted to the Roanoke MSA Over Three Years

	Jobs
Direct Employment	
Warehouse/Storage	110
Truck Transportation	110
Manufacturing	110
Total Direct Employment	**330**
Total Employment (Direct, Indirect, and Induced)	
Warehouse/Storage	173
Truck Transportation	230
Manufacturing	233
Total Employment (Direct, Indirect, and Induced)	**636**

Source: AECOM Analysis

The employment and development at Greencastle are based on growth over three years (2010-2013). In order to more adequately estimate a longer-term forecast of growth over the 30-year analysis period, development at the Virginia Inland Port (VIP) at Front Royal, Virginia was analyzed. Originally intended by the Port of Norfolk to expand the market reach and compete with the Port of Baltimore, the facility

[9] The employment impacts from the potential new development associated with the Western Virginia Intermodal Facility are estimated for the Roanoke, VA MSA based on the warehouse/storage, truck transportation, and an average of all manufacturing industries direct-effect employment multipliers from RIMS II. The direct-effect RIMS II multipliers for the region are 1.5763 (Warehouse/storage), 2.0952 (Truck transportation), and 2.1148 (average for all manufacturing industries).

began operations in 1989[10] and today has a capacity of 78,000 TEUs per year[11]. An absence of zoning and vision contributed to the lack of adjacent development initially, as evidenced by the golf course across the street from the VIP. Like the Western Virginia Intermodal Facility location, VIP has rail access by NS to the Port of Norfolk. By road, VIP is only one mile from I-66 and five miles from I-81, providing quick access to and from the larger population centers located along these major interstates. The adjacent land was previously undeveloped farm land, but the surrounding areas were supportive of its development to uses that would complement the intermodal facility. Development took time, in part due to competition with the Port of Baltimore, and in part because its original intent to compete with Baltimore evolved to what the facility is today: a complementary distribution center for the Port of Norfolk. As of 2011, VIP had attracted 39 companies that invested $747 million to develop 8.5 million square feet of facilities. These companies employ approximately 8,000, while VIP itself only directly employs 17[12].

As a high-end estimate, the Western Virginia Intermodal Facility and surrounding businesses could employ up to 4,300 after 30 years.

The VIP cost approximately $13.3 million to build in 1987 and has operated in the black since 1994. The facility was developed through funds from the Virginia Transportation Trust Fund. It operates well below capacity, but contributes to millions of miles of truck traffic being taken off of Virginia's highways annually.

The Western Virginia Intermodal Facility could function similarly, while learning lessons from VIP's early days. One of VIP's strengths was its proximity to large population centers like Washington, D.C. and Baltimore which was attractive to distribution centers. Because the nearest population center to the Western Virginia Intermodal Facility is the Roanoke MSA, the potential of the number and size of distribution centers that could locate nearby is limited due to the size of the Roanoke MSA comparatively. Another lesson to be learned from VIP was that the adjacent land was not zoned properly, which limited the number and size of facilities that could locate nearest to the facility. The initial goal for the VIP also had to be adjusted as it grew, changing its vision and its function to better serve the need at the Port of Norfolk. In a similar way, perhaps the Western Virginia Intermodal Facility could function as a small-scale distribution center initially, but in the future as space near Greensboro and Prichard's facilities get maxed out, the Western Virginia Intermodal Facility could become a lower cost option with available space to relieve the pressure. Finally, the public assistance and incentives offered by the State of Virginia and the PPP with NS also contributed to its success[13].

As a high-end estimate, the Western Virginia Intermodal Facility and surrounding businesses could employ up to 4,300 after 30 years based on the growth experienced at VIP[14]. However, as noted above, the growth at the Western Virginia Intermodal Facility would not likely be at the same scale as experienced at VIP, but one would expect an initial surge in development, as outlined in **Exhibit 6**, followed by intermittent job gains over time.

Benefit Cost Analysis Results

Exhibit 7 summarizes the discounted value of the total costs and benefits from a total economic perspective for Scenario 2, which shows the highest ratios. The benefits include:

[10] National Cooperative Freight Research Project (NCFRP) Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, CWS Consulting Group, LLC, May 2011, http://www.freightlocation.org/Downloads/ncfrp_w001.pdf

[11] Virginia Inland Port (VIP) Specs, Port of Virginia, http://www.portofvirginia.com/facilities/virginia-inland-port-vip/specs/

[12] National Cooperative Freight Research Project (NCFRP) Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, CWS Consulting Group, LLC, May 2011, http://www.freightlocation.org/Downloads/ncfrp_w001.pdf

[13] National Cooperative Freight Research Project (NCFRP) Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, CWS Consulting Group, LLC, May 2011, http://www.freightlocation.org/Downloads/ncfrp_w001.pdf

[14] And factored by the capacities of the facilities.

The Western Virginia Intermodal Facility will provide greater public benefits than cost to the region, under some scenarios.

- **Shipper Savings**: With the construction of an intermodal facility, goods traveling by truck or rail will be able to interchange to rail in the Western Virginia area. This intersection of modes results in competition between trucking companies and NS, which results in lower transportation prices for shippers and manufacturers. These shipper savings result from the rail mode's ability to move a greater volume of goods per train, and rail is more fuel efficient than shipping by truck, particularly for large loads or shipments traveling longer distances. It is estimated that railroads charge between 10% and 30% less for containerized rail services than trucks in the same shipping lanes.[15] As part of the workshops and interviews conducted for this study, sample truck rates for Western Virginia's major shipping lanes were collected and used to estimate the savings on a per-mile basis. At a 7% discount rate, Scenario 2 volumes result in $16.25 million in shipper savings.
- **Residual Savings**: Construction of the new track and highway road/bridge improvements, as well as the land purchases required for the project, will have residual value after the end of the 30-year analysis period because the useful life of these elements is longer than 30 years. Depreciated straight-line over the remaining useful life after the analysis period, the residual value of the project elements totals $1.46 million at the 7% discount rate for all scenarios.
- **Pavement Savings**: The reduction in truck VMT associated with the diversion of truck shipments to rail with the Western Virginia Intermodal Facility reduces the wear and tear on the pavement for regional roadways, and as such, reduces the marginal cost of maintaining the pavement. The marginal savings of pavement for Scenario 2 at the 7% discount rate is $3.08 million.
- **Congestion Savings**: The reduction in truck VMT benefits the remaining users on the regional roadways and reduces the marginal cost of congestion on these other vehicles. The marginal cost of congestion for trucks is based on the VMT avoided and the routes taken. In total, the congestion savings under Scenario 2 at the 7% discount rate totals $3.55 million.
- **Emissions Reductions**: The reduced truck VMT results in reduced emissions including carbon monoxide (CO), nitrogen oxide (NOx), volatile organic compounds (VOCs), particulate matter (PM), sulfur dioxide (SO2) and carbon dioxide (CO2). The emissions savings for Scenario 2 under the 7% discount rate total $4.58 million.
- **Safety Incidents Avoided**: The Western Virginia Intermodal Facility would provide shippers in the Western Virginia region with better access to intermodal rail service on the Heartland Corridor and potentially the Crescent Corridor, which would provide an opportunity for shippers along these routes to divert current or future truck shipments to rail—thereby reducing truck VMT. This avoided truck VMT reduces the likelihood of crashes and associated deaths, injuries, and property damage on regional roadways. The safety incidents avoided total $8.36 million for Scenario 2 at a 7% discount rate.

In total, a range of $16-$69 million dollars of benefits are estimated over the analysis period for all four scenarios. Compared to similarly discounted cost estimates, the BCRs for the project range from 0.26 under Scenario 4 to 1.14 under Scenario 2. The project's benefits and costs are shown below.

[15] Schoonmaker, Keith, "UP produced record revenue and operating income in 2013, and we expect the trend to continue," July 1, 2014, http://analysisreport.morningstar.com/stock/research?t=UNP&region=USA&culture=en-US&productcode=MLE

Exhibit 7: Scenario 2 Benefit Cost Analysis

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Less Lift Fee Revenues	*$ 12.66*	*$ 14.60*	*$ 16.94*	*$ 19.82*	*$ 23.36*
Total Costs	***$ 57.34***	***$ 58.33***	***$ 59.21***	***$ 59.94***	***$ 60.45***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 3.08	$ 3.54	$ 4.11	$ 4.81	$ 5.67
Congestion Savings	$ 3.55	$ 4.09	$ 4.74	$ 5.55	$ 6.54
Shipper Savings	$ 16.25	$ 18.73	$ 21.74	$ 25.43	$ 29.98
Emissions	$ 1.74	$ 2.00	$ 2.31	$ 2.68	$ 3.15
CO2	$ 2.84	$ 2.84	$ 2.84	$ 2.84	$ 2.84
Safety	$ 8.36	$ 9.64	$ 11.18	$ 13.08	$ 15.42
Total Benefits	***$ 37.27***	***$ 42.84***	***$ 49.70***	***$ 58.23***	***$ 68.93***
BC Ratio	**0.65**	**0.73**	**0.84**	**0.97**	**1.14**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010
Source: AECOM

Considerations and Conclusions

The results above highlight a number of features about the project's feasibility in today's conditions. These are summarized in the discussion below.

Economic Feasibility

- From an economic impact perspective, there are scenarios under which the project is an economic success. Moreover, of the benefits estimated, shipper savings are the largest single outcome. Because the facility is likely to be used predominantly by local firms in the broader Western Virginia region to access a larger domestic region, this benefit is notable because the shipper savings are likely to be enjoyed primarily by these local firms. This is a benefit that is largely experienced locally.
- The shipper benefits represent the projected savings offered by the project. These are the catalyst for economic development impacts such as jobs and earnings as firms locate to take advantage of shipper savings.
- The majority of project benefits, however, are experienced in a more spatially diffuse region—emissions, pavement wear, congestion, and safety benefits for example—and are not constrained to the Western Virginia region. These are real benefits but are more state and interstate in their generation and not confined to Western Virginia.

The majority of project benefits are experienced not just in Western Virginia, but state-wide or interstate.

- Western Virginia is not the only beneficiary. On net, the majority of the economic benefits in the BCA are likely experienced outside of the Western Virginia region.
- The location of the facility in relation to the Port of Virginia limits the size of the market that it will serve. Because of the comparatively short distance to the Port, the cost and time of using rail is not competitive with trucking.
- Though this is a comparatively small facility as designed, there is precedent for a small facility to grow and evolve as evidenced by the Virginia Inland Port at Front Royal. Consistent with the literature review, this facility would predominately serve the local export market. Low volume terminals have a harder time maintaining customers if train frequencies are below three per week and competing for containers as ocean carriers prefer to supply higher volume facilities.

Financial Feasibility

- From a financial return perspective, the project requires a subsidy under most scenarios and discount rates. A recent review of new inland intermodal facilities shows almost all have been constructed with a majority of public funds. A private operator would consider this investment given the projected operating revenues from lift fees cover the operating costs. Under all scenarios, the project covers 112% to 212% of its operating costs.
- Considering only the annual operating costs and the revenues from lift fees, the facility could bring in enough to cover the operating expenses and have some left over to put towards the capital loan, if one could be secured.

Under all scenarios, the project more than covers its operating costs.

What's Changed?

- Many things have changed since the project was first studied. One of the most surprising results from this study is that the most influential change to affect the project's feasibility compared with the past is the project's cost, not external factors such as a lingering recession, port traffic, or new trade patterns. The project's cost is now more than double its estimated cost when first conceived. This cost increase is driven by physical changes at the selected site that require additional road and track work that would not have been required ten years ago. These cost increases make the project financially infeasible at the projected scale of activity.
- Unlike the past, there is no identified "anchor user" for the facility. In the past, the facility's owner had been able to identify a user that would account for a significant share of business from opening day. While many users contacted for this study indicated that they would use this facility and/or would have interest in it, none indicated sufficient volumes to account for a significant share of the facility. The facility's owner will have to assemble volumes from multiple small shipments from day one.
- Past studies did not evaluate the facility as a stand-alone operation but rather as part of the much larger Heartland Corridor system.

What Could be Done?

- Because the project has economic benefit to the region, it could be beneficial to consider an alternative scale for the facility. Changing the design and scale of the facility could be reconsidered which could allow the region to receive a similar level of economic benefits for a much lower cost. Due to the discovery that neither 15,000 annual lifts nor 65 acres are dictated by market or physical conditions, it is conceivable that a smaller Phase I of a facility could be viable, reducing the initial capital costs.

- The analysis considers a maximum lift capacity of 15,000 lifts per year throughout the analysis period. This results in the need to "cap" the first two scenarios even though the theoretical volumes that result from the markets would be higher than the 15,000 lifts. If the facility were able to handle more lifts, it could bring in more revenue.
- Capital subsidies from the Commonwealth would lower the capital cost of the facility, which removes some of the financial risk from the operator but does not remove the risk of the performance measure.
- Other capital funding sources could be sought, such as value-capture from real estate developments, a TIGER grant, or development donations.

Due to the discovery that neither 15,000 annual lifts nor 65 acres are dictated by market or physical conditions, it is conceivable that a smaller Phase I of a facility could be viable, reducing the initial capital costs.

Cost of Doing Nothing

Just as there can be benefits to making investments, there can be costs to doing nothing and not capitalizing on opportunities. In the broader economic sense, not constructing an intermodal facility in the Western Virginia region would result in the region's continued exclusion from industrial site selections that require or prefer intermodal connectivity. The region has a bulk facility in downtown Roanoke, but no intermodal container yard, which limits the region's ability to attract new or expanding businesses. However, under current conditions the facility envisioned ten years ago is not recommended because the physical characteristics of the site and the competitive environment in which the facility would operate have changed in ways that make this design less desirable than once anticipated. Is there a cost to not making investments to support Western Virginia's freight economy—yes—but the shape those investments take to support the economy has changed since ten years ago with the evolution of Western Virginia's economy and the broader competitive environment.

That said, the report also found a large freight-dependent core to Western Virginia's economy and many major shippers interested in improvements. A redesigned facility could play an important role in supporting this part of the economy. Other freight initiatives that could support Western Virginia's freight economy include:

- Organization of a regional logistics team with the purpose of partnering shippers and manufacturers in the region and assisting in the coordination of inbound and outbound shipments and combining Less Than Truckloads (LTLs)
- Creation of a chassis and/or container pool with Port designation
- Construction or approving connections of rail-served sites
- Develop infrastructure/policies that encouraging shorter drays due to the shortage of and difficulty in attracting long-haul truckers
- Improve infrastructure/policies to reduce the need for weight restrictions
- Improve coordination between states for overweight permissions
- Construct truck-stops in the region
- There is limited grain production, but a silo for packing it in containers would be beneficial

In the broader economic sense, not constructing an intermodal facility in the Western Virginia region would result in the region's continued exclusion from industrial site selections that require or prefer intermodal connectivity.

Glossary

CSX Corporation	A Class I rail transport company that operates 21,000 route miles in 23 states, D.C., and the Canadian provinces of Ontario and Quebec with access to over 70 ocean, river, and lake port terminals along the Atlantic and Gulf Coasts, the Mississippi River, the Great Lakes and the St. Lawrence Seaway. (www.csx.com)
Crescent Corridor	A 2,500 mile rail infrastructure project operated by Norfolk Southern and spanning from New Orleans and Memphis to Philadelphia, New York City, and Mechanicville, NY. It provides one of the fastest, most direct routes from the Southeast to the Northeast.
Differential Shift Indicator	Produced as part of a shiftshare analysis. It measures an industry's performance, in terms of employment, within the local economy as compared to that same industry's performance within the reference economy across a span of years.
Economic Growth Indicator	Produced as part of a shiftshare analysis. It measures the aggregate employment changes in the reference economy across a span of years.
FAF	Freight Analysis Framework. Provides a comprehensive picture of freight movement across states by all types of transportation by integrating data from a variety of sources.
Forty-foot Equivalent Unit (FEU)	Used to describe the volume of a 40-ft long intermodal container.
Heartland Corridor	A public-private partnership between Norfolk Southern Railway and the Federal Highway Administration to improve railroad freight operations between the Port of Virginia and Chicago, Detroit, Columbus, and Cincinnati, by offering improved speeds and tunnel clearances that allow for double-stacked intermodal trains.
Intermodal	Freight movement involving a standardized container that can be moved from one mode of transport (ship, rail, and truck) to another without having to unload and reload its contents.
Location Quotient (LQ)	Measures the concentration of employment in a local economy as compared to that of a larger region at a point in time. Location quotients will be greater than 1 for a local economy with a comparative advantage in an economic sector, while it will be less than 1 for a local area importing goods or skills in that sector.
MAIS	Maximum Abbreviated Injury Score, a scale designed to describe the severity of different types of injuries.
MAP-21	Moving Ahead For Progress in the 21st Century Act. Signed into law in 2012, it provides surface transportation programs with over $150 billion in funding for the next two fiscal years. This allows to sustain the Highway Trust Fund for that duration and enable states and communities to build transit systems, roads, and bridges, while improving safety throughout all forms of transportation.
Norfolk Southern Railway (NS)	A Class I rail transport company that operates 20,000 route miles in 22 states and D.C. with service to every major Eastern seaport, ten river ports, and nine lake ports. It operates the most extensive intermodal network in the East. (www.nscorp.com)

PFN	Primary Freight Network. A proposed network comprised of no more than 27,000 centerline miles of existing roads that are considered to be the most critical to the movement of freight.
Proportional Shift Indicator	Produced as part of a shiftshare analysis. It measures the relative growth or decline of the local economy as compared to the reference economy across a span of years.
R/C Ratio	A ratio that compares revenue generated by lift fees to the individual cost components.
Shiftshare Analysis	Compares local industry strengths to the U.S. in terms of employment. There typically are three indicators considered: Economic Growth, Proportional Shift, and Differential Shift, which are also defined in this glossary.
Supply Chain	A system of organizations, activities, people, resources, and information involved in moving a product or service from supplier to customer.
TIGER	Transportation Investment Generating Economic Recovery, a DOT discretionary grant program that allows applicants to submit funding requests for a variety of transportation projects that would deliver benefits in safety, economic competitiveness, state of good repair, livability, and environmental sustainability.
Twenty-foot Equivalent Unit (TEU)	Used to describe the volume of a 20-foot long intermodal container.
53-foot Container	A type of intermodal container that is 1 foot taller than standard containers and offers 60% more capacity than the standard 40-foot container.

Acronyms

AADT	Average annual daily traffic
BCA	Benefit Cost Analysis
BCR	Benefit Cost Ratio
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
CAGR	Compound Annual Growth Rate
CCTV	Closed Circuit Television
CO	Carbon Monoxide
CO2	Carbon Dioxide
EPA	Environmental Protection Agency
FAF	Freight Analysis Framework
FCADC	Franklin County Area Development Corporation
FD	Final Design
FEU	Forty-foot equivalent unit
FHWA	Federal Highway Administration
FMSCA	Federal Motor Carrier Safety Administration
FTZ	Foreign Trade Zone
GDP	Gross Domestic Product
HOS	Hours of Service
LQ	Location Quotient
LTL	Less Than Truckload
MAIS	Maximum Abbreviated Injury Scale.
MAP-21	Moving Ahead For Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
MWV	Mead Westvaco
NCFRP	National Cooperative Freight Research Project
NHTSA	National Highway Traffic Safety Administration
NOx	Nitrogen Oxide
NS	Norfolk Southern
O&M	Operating and Maintenance
PC	Panama Canal
PFN	Primary Freight Network
PM	Particulate Matter
QCEW	Quarterly Census of Employment and Wages
RCS	Regional Conveyor Services
R/C Ratio	Revenue/Cost Ratio
RVARC	Roanoke Valley-Allegany Regional Commission
SO2	Sulfur Dioxide
TEU	Twenty-foot equivalent unit
TIF	Tax Increment Financing
TIGER	Transportation Investment Generating Economic Recovery
US	United States
US DOT	United States Department of Transportation
VDOT	Virginia Department of Transportation
VDRPT	Virginia Department of Rail and Public Transportation
VIP	Virginia Inland Port
VOC	Volatile Organic Compound
VMT	Vehicle Miles Traveled
VSL	Value of Statistical Life

Study Background and Purpose

The development of a Western Virginia Intermodal Facility near the intersection of two major Norfolk Southern (NS) freight corridors (Heartland and Crescent) is a project with a complex history. The following summarizes the history and the changed conditions that warrant the reexamination of the project and its potential impacts.

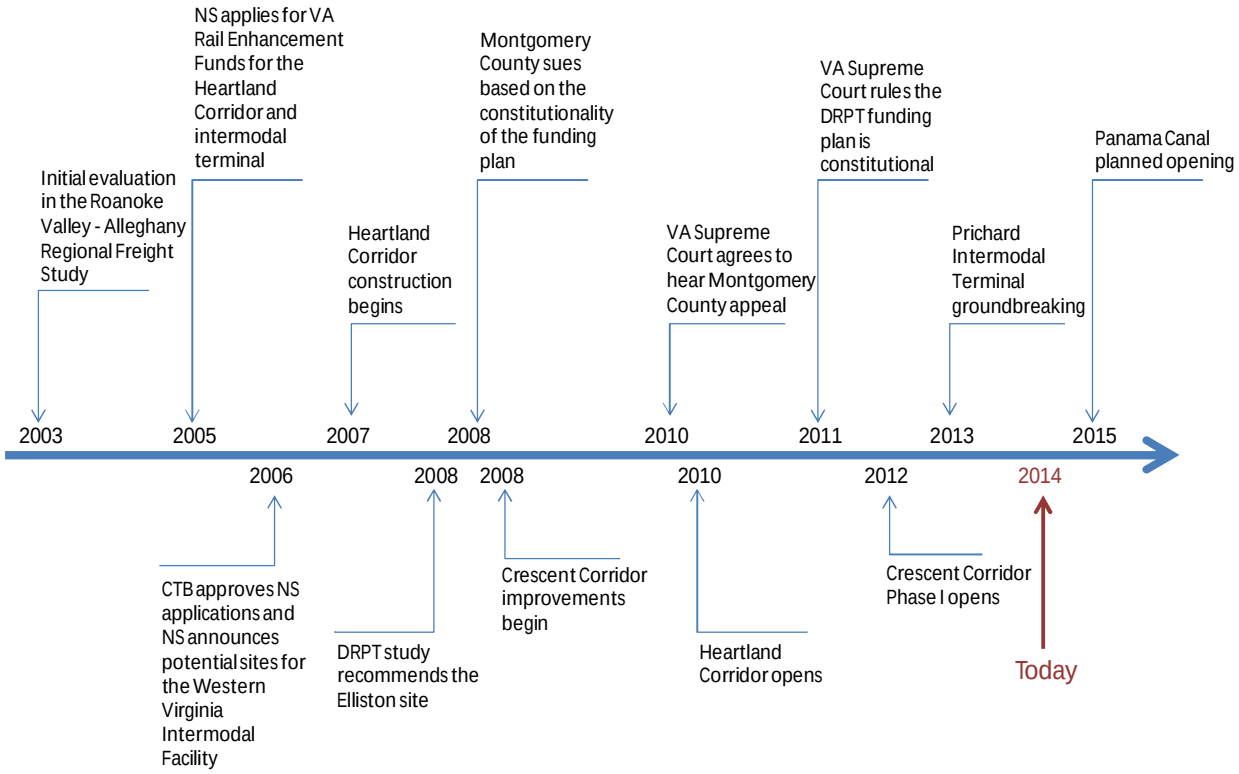
An initial look at the feasibility of an intermodal facility in the Western Virginia region was taken as part of the *Roanoke Valley - Alleghany Regional Freight Study Final Report* (Wilbur Smith, 2003), which indicated that the facility was not feasible at that time, due to the unbalanced freight flows in the region (higher volumes of outgoing containerized freight than incoming). However, with the construction of the Heartland Corridor double-stacking project underway in 2007, interest in the location of an intermodal facility in the Western Virginia region resurfaced.

Due to the potential for new freight demand and growth along NS's Heartland Corridor and increasing highway congestion on I-81, the Virginia Department of Rail and Public Transportation (DRPT) undertook a new study to evaluate a Western Virginia Intermodal Facility in 2008. This study included an economic assessment of the potential economic impacts (jobs, output, and tax revenues) and identified the potential public benefits of an intermodal facility in the Western Virginia area (not site specific) and the Heartland Corridor between a facility and Norfolk. The benefits of the Heartland Corridor and the intermodal facility were estimated to pay for the investment after five years, though the return on investment of the intermodal facility alone was not presented. As part of this study, DRPT also evaluated ten potential sites in the Western Virginia region for the intermodal facility, taking them through three screening phases that ultimately resulted in the selection of the Elliston site in eastern Montgomery County. The results of the study were presented to local and state elected officials to provide an opportunity for these officials to discuss the proposed intermodal facility in a regional setting. Local and state officials were able to comment on the facility, the site selection process, and potential impacts.

With the DRPT recommendation of the Elliston site in place, further development of the intermodal facility was delayed due to a legal challenge by Montgomery County on the constitutionality of the state funding 70% of the original facility cost.[16] The timeline in **Exhibit 8** summarizes the site selection, legal challenge, and the events that followed.

[16] The remaining 30% would be paid by Norfolk Southern or another intermodal operator.

Exhibit 8: Western Virginia Intermodal Facility and Related Events Timeline



With the Virginia Supreme Court ruling in 2011 that the state funding plan was constitutional due to its ability to increase capacity along I-81, the project cleared its legal hurdles but faced new economic struggles. The economic recession's impacts on freight movements and NS's market condition created a difficult environment in which to implement a new intermodal facility in the region. As a result, the Western Virginia Intermodal Facility development was delayed and continues to be today.

Since the last Western Virginia Intermodal Facility studies were completed, the economic and freight conditions surrounding the facility have continued to evolve, painting a different context for the intermodal facility than has been studied previously. Some of the most notable changes include:

- **Economic recession**: The economic recession significantly impacted freight movements and NS business through weakened private and public investment, as well as decreased freight demand. While recovery is underway, it has been slower than in previous contractions. The recovery is of particular interest to the project because the Western Virginia Intermodal Facility funding agreement calls for NS to move an additional 150,000 containers through the site by the fifth year of the facility's operation, or NS would have to repay some of the state's investment.
- **Crescent Corridor**: The previous studies focused on the impacts of facility considering only the completion of the Heartland Corridor. However, the facility is also located along NS's Crescent Corridor, which has seen a $2.5 billion investment in improving speeds of freight movement between Louisiana and New Jersey and includes the introduction of four new terminal facilities in Birmingham, AL; Memphis, TN; Charlotte, NC; and Greencastle, PA. The growth of freight moving through this corridor has the potential to influence the demand and use of an intermodal facility at the Elliston site, impacting previous estimates of container traffic growth.
- **Heartland Corridor**: The Heartland Corridor is fully operational. As a result, estimates of container traffic growth for the facility can be revisited in light of actual experience.

- **Growth at the Port of Virginia**: The Panama Canal expansion improvements are much closer to planned completion (2015), increasing the likelihood that the largest container ships serving Asia will call on eastern U.S. ports. Because of dredging costs and environmental constraints, only a small subset of eastern ports currently has sufficient depth and capacity to handle these ships – including the Port of Virginia (Port). The increased cargo traffic through the Port of Virginia could result in higher traffic volumes at inland intermodal freight facilities.
- **Competing intermodal facilities**: In prior studies, the Western Virginia Intermodal Facility was farther along in the development process than the proposed Prichard, WV intermodal facility, which is also located along the Heartland Corridor. As a result, the impact of the Prichard facility was assumed to be secondary to that of the Western Virginia Intermodal Facility in previous studies, due to the fact that Western Virginia would have already established its place in the market. However, due to the State of West Virginia's financing and advancement, the Prichard facility broke ground in 2013, making it operational before the Western Virginia Intermodal Facility. In light of this development, estimates of container growth and potential users of the Western Virginia Intermodal Facility will need to be revisited in order to assess whether and how the competing facilities affect the necessity of a facility in the Western Virginia region.
- **Growing emphasis on national freight corridors:** With the passage of Moving Ahead for Progress in the 21st Century (MAP-21) in 2012, the federal government has placed a larger emphasis on improving the condition and performance of the national highway freight network and supporting investment in freight-related surface transportation projects. The Western Virginia Intermodal Facility is located along a portion of I-81 that is included in the proposed federal Priority Freight Network (PFN). As a result, the movement of highway freight is going to continue to grow in this region and along the PFN corridor. The intermodal facility could help alleviate congestion and increase capacity along the I-81 PFN in the Western Virginia region by diverting freight to rail.

Due to these evolving conditions, this study is designed to evaluate what has changed and what remains true from the previous studies and to determine whether the Western Virginia Intermodal Facility is still economically viable. Using the significant body of existing work on the Western Virginia Intermodal Facility, publically available freight data, as well as stakeholder workshops and interviews with potential users and regional economic development staff and planners, this study will assess the intermodal facility's market feasibility by considering potential users and their utilization of the facility, issues and factors that may affect the use of the facility or create obstacles to its market feasibility, economic impacts on the broader community (both positive and negative), and whether the potential return on investment for the facility supports the investment in light of today's economic and logistics conditions.

Project Description

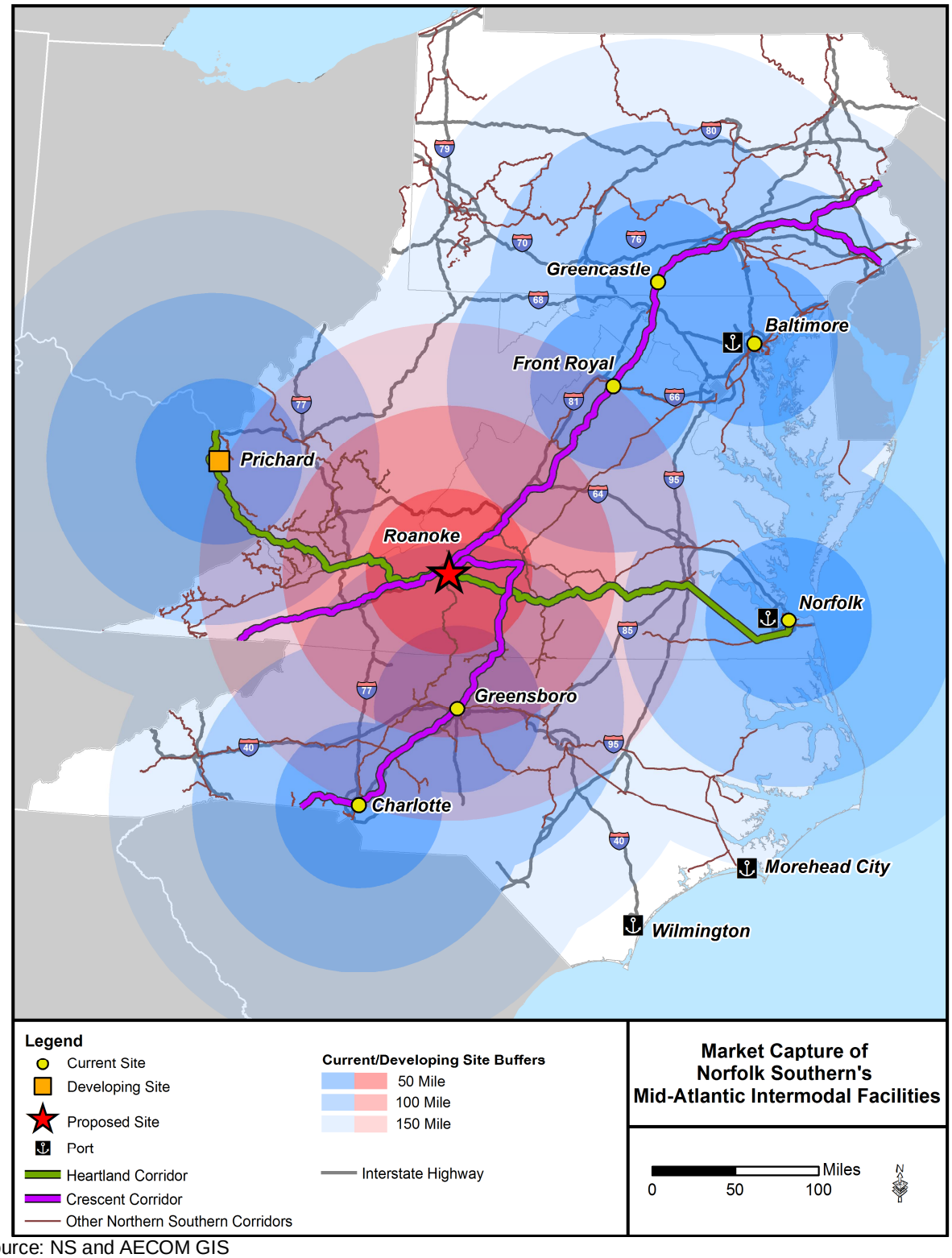
Location

The intermodal facility is to be located just southwest of Roanoke, VA near the small towns of Elliston and Lafayette, VA. The selected site is just inside of Montgomery County along U.S. Route 460 and within close proximity to Interstate 81. The proximity to the Interstate and the larger Roanoke metropolitan area means that the industries that will likely utilize the facility are those already existing in the region.

The Western Virginia region has the strategic advantage of being at the interchange of NS's Heartland and Crescent Corridors. As such, the facility could theoretically serve two different market opportunities: the Heartland international traffic and the Crescent domestic market. However, discussions with NS indicated that the facility would only service Heartland trains. Aside from the proposed facility in the Western Virginia region, NS has a number of other facilities that will be competing for intermodal volumes. **Exhibit 9** shows the competing NS intermodal facilities and corresponding 100-mile and 150-mile buffers[17]. The 100-mile buffer from Roanoke overlaps with the market areas of at least four other facilities including Prichard (future), Front Royal, Greensboro, and Charlotte. As a result of this overlap, the facility in the Western Virginia region would compete with at least three other facilities for truck drays of intermodal goods, and directly with Prichard because they are both on the Heartland Corridor.

[17] Industry averages for the market capture for an intermodal facility typically range from 100 to 150 miles.

Exhibit 9: Market Capture for Western Virginia Intermodal Facility – 100 and 150 miles



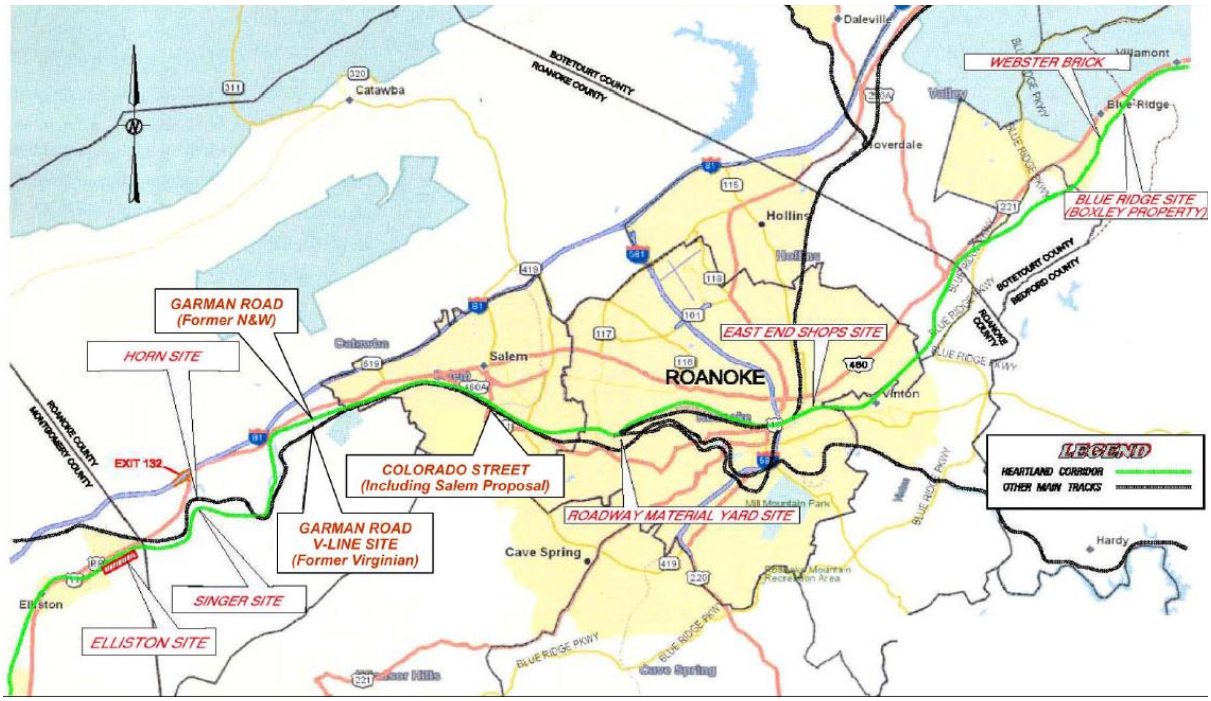
Source: NS and AECOM GIS

A major factor in the competitiveness of the facility in the Western Virginia region is its proximity to the Port of Norfolk. As a rule of thumb, facilities within approximately 500 miles[18] of marine ports typically are not heavily used for rail, because at shorter distances rail pricing is too high unless there are subsidies or large volumes that necessitate its use. At shorter distances, including the distance between Western Virginia and Norfolk, most shippers would put their goods on trucks to get them to or from the Port. As a result, the market for rail between the Port and Western Virginia is limited. Intermodal facilities located farther west from the Port, such as Prichard, will be more competitive with rates for rail to or from the Port. However, the Western Virginia Intermodal Facility could be attractive for regional rail shipments to and from locations to the west that are farther than the competitive trucking distance of approximately 500 miles.

Existing Site

The Elliston site selected for the facility is approximately 65 acres in northern Montgomery County, VA. The site was one of ten analyzed sites presented by NS as described in the 2008 report by DRPT[19]. All of the ten candidate sites were within the Roanoke region, including Botetourt County, the City of Salem, City of Roanoke, Montgomery County, and Roanoke County. The ten sites are shown in **Exhibit 10** below.

Exhibit 10: Proposed Intermodal Facility Site Locations



Source: DRPT, Roanoke Region Intermodal Facility Summary Report, 2008

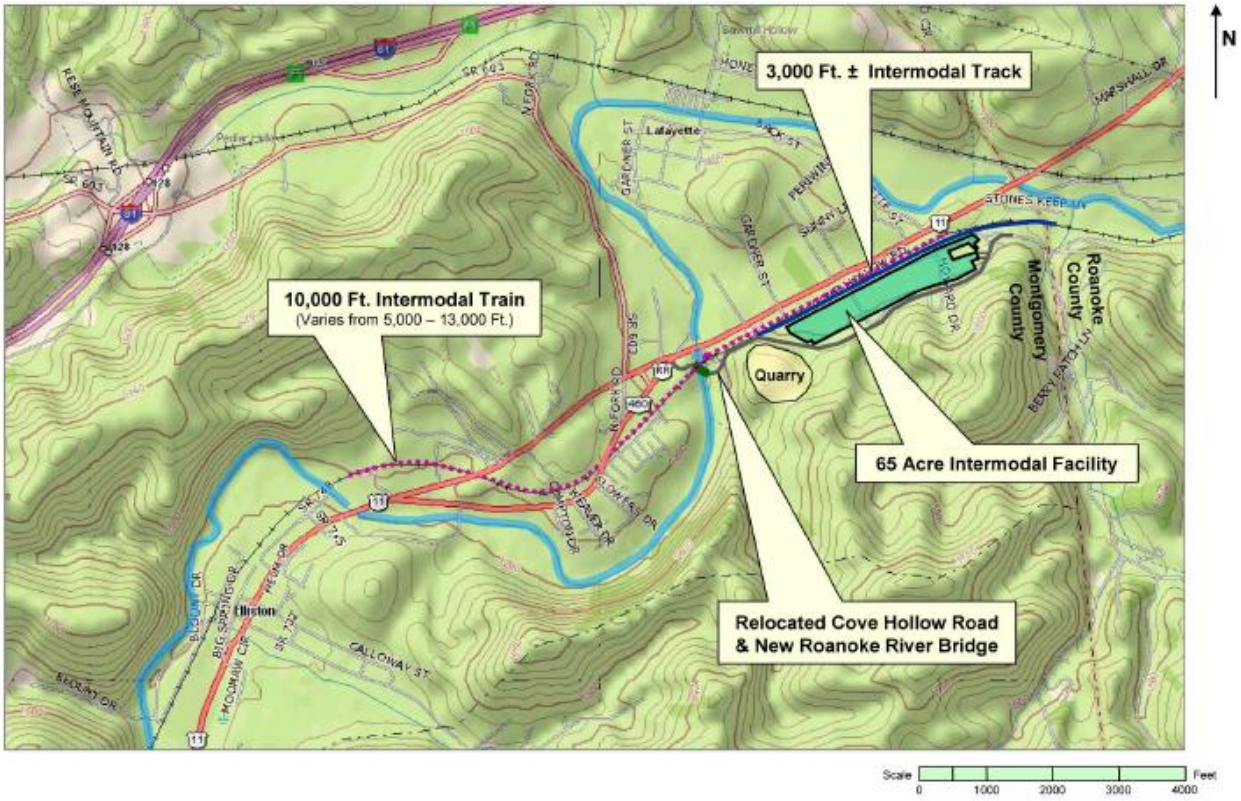
After the first phase of evaluations, five of the ten sites were eliminated from consideration. Issues with the five sites included inadequate site sizes, large grade variations, and additional infrastructure needs. After the second phase of evaluations, an additional two sites were eliminated due to infrastructure needs and geometric constraints on the tracks. The final round of evaluation compared the remaining sites on the following criteria: rail operations in the region, noise, air quality, transportation impacts and needed

[18] A good rule of thumb, according to the CSX interview and workshop discussions, is about 500 miles, but it can vary depending on subsidies and traffic.

[19] DRPT, Roanoke Region Intermodal Facility Summary Report, 2008

improvements, other potential environmental issues, and project costs. The Elliston site was, at the time, the least expensive option at $35.5 million and was the only site to pass in all key evaluation criteria. The Elliston site, seen in **Exhibit 11**, was expected to have low potential for contaminated soils and low impact due to high ambient truck/train and other background noise, and it was located in an attainment area for all criteria pollutants. It was also anticipated that it would require only four residences and one farm displacement. The location is directly on the Heartland Corridor with good rail operations and no impacts to existing rail operations. It has good access to Route 460 and I-81, but would require relocating Cove Hollow Road for site access and the associated right of way. The road construction would also require a bridge over the Roanoke River. In summary, the site had the best proximity to highways and the Heartland Corridor, would cause the smallest impact to existing landowners, traffic, and businesses, and minimized roadway costs.

Exhibit 11: Elliston Site



Source: DRPT, Roanoke Region Intermodal Facility Summary Report, 2008

NS has already purchased some of the land required for the facility's construction. In total, according to the Montgomery County Appraiser's website, NS paid nearly $3 million from 2009-2012 to purchase three parcels of land in preparation for the facility. The sales price and 2012 appraised value are shown in **Exhibit 12**. If the facility construction were to move forward, NS would need to purchase more of the adjacent land. However, if the project were cancelled, NS could sell the property to recoup some of the costs. A map of the parcels that NS owns is shown in **Exhibit 13**, with their parcels highlighted in blue.

Exhibit 12: NS Property Purchases

Parcel	Year	Acres	Sale Price	Assessed Value (2012)
160410	2009	22.035	$ 1,100,000	$ 869,800
009048	2012	18.607	$ 1,300,000	$ 46,500
010691	2009	2.739	$ 575,000	$ 32,800
Total		**43.381**	**$ 2,975,000**	**$ 949,100**

Source: Montgomery County, Virginia Property Records

Exhibit 13: Parcels Owned by NS

Source: Montgomery County iGIS Map Portal

Project Costs

Because an intermodal facility in the Western Virginia region has been studied for many years, there have been a number of capital cost estimates. Two studies conducted in 2008 estimated different construction costs of the facility. HDR Decision Economics estimated a cost of between $21 and $31.2 million, with an expected cost of $26 million[20]. DRPT, also in 2008, estimated a total cost of a facility located in Elliston to be $35.5 million. An updated cost estimate, provided to the AECOM team by the NS Strategic Planning department, increased the estimate to $71 million.

The higher estimate provided by NS is a result of three primary factors. First, more than eight years have passed since the last estimate of the facility was developed by NS, which means that the construction

[20] HDR|HLB Decision Economics, Inc., Economic Assessment of a Roanoke Region Intermodal Facility Final Report, January 7, 2008

costs have increased due to inflation and real construction cost growth. Second, the facility estimate includes longer lead tracks from the Heartland Corridor main line to the facility. These longer lead tracks are needed to allow trains to pull off of the main line towards the intermodal facility without blocking the main line. Finally, the cost for relocating Cove Hollow Road also has increased and now requires a bridge that was not originally planned.

The NS estimate, as broken-down by its components, is shown in **Exhibit 14**. The construction cost of the facility is estimated to be $70.7 million as of 2014.

Exhibit 14: Construction Costs

Construction Costs	2014 $M
Grading/Drainage	$43.70
Trackwork	$6.00
Real Estate	$9.20
Signals	$3.20
Facility	$2.60
Bridges	$6.00
Total Construction Costs	**$70.70**

Source: Norfolk Southern

In addition to the updated capital costs, NS provided AECOM with an estimated construction schedule. The schedule of cumulative costs expended, shown in **Exhibit 15**, estimates 30 months for completion. The analysis assumes construction begins in July 2016 and the facility opens for operation in January 2019.

Exhibit 15: Construction Spending Schedule

Elapsed Time	Cumulative Spending %
6 Months	10%
12 Months	40%
18 Months	80%
24 Months	90%
30 Months	100%

Source: Norfolk Southern

The updated NS estimate of the facility capital cost was independently verified by AECOM. In the process, AECOM developed an estimate based off of the specs of the facility including:

- 15,000 lifts
- 65 acres
- +/- 3,000 feet of intermodal tracks
- No complementary services, just minimal storage of chassis and containers for pick-up and drop-off

The AECOM estimate confirmed that the updated NS estimate was reasonable, with the AECOM price coming in slightly higher at $77.53 million. The estimate assumes approximately 55 acres are covered in pavement, though it was noted that the size of the facility is much larger than would be expected for handling only 15,000 lifts per year. The AECOM estimate also includes 10,000 feet of lead track to allow trains to come off of the main line at speed to avoid operational conflicts. NS's estimate also includes

lead track, but the quantity is unspecified. An abbreviated estimate can be seen in **Exhibit 16**, and the full details of the estimate can be found in **Appendix A**.

Exhibit 16: AECOM Capital Cost Estimate

	2014 $M
Preconstruction	$0.27
General Requirements	$6.82
Site Construction	$37.65
Trackwork	$5.99
Buildings & Canopy	$0.91
Mechanical	$0.59
Electric, Communication, CCTV	$1.50
Contingency/Engineering FD	$8.84
Other* Costs	$14.96
Total	**$77.53**

Note: Other* Costs include engineering and construction management, crane and sign removal, property relocation and acquisitions, get technologies, and environmental costs.
Source: AECOM

The Operation and Maintenance (O&M) costs for the facility are estimated to be at $500,000 per year based on typical intermodal facility costs and NS experience. This estimate is considered the minimum and includes the following conditions:

- Very limited facility operating hours
- Limited on-site supervision
- Facility is not operating on weekends or days when trains are not scheduled to arrive or depart
- Service coverage with part-time employees
- Limited security coverage

In the scenario where the facility has longer operating hours, as well as more coverage and supervision, the O&M costs for the facility are estimated to be $1-1.5 million per year.

Facility Function

Because the Western Virginia Intermodal Facility is still in the planning stages, there is no official operating plan. However, NS and previous studies have discussed potential operating characteristics, and the following are assumed in this study:

- **Hours of operation**: NS has indicated that, on the low end, the facility would be open only when trains are arriving and departing and there would be limited on-site supervision and security coverage. A more comprehensive service with the facility operating 24x7 would require higher operating costs as a result of more staff and functionality.
- **Container storage**: The facility would have limited storage for container lay-down and chassis, and would have very limited truck parking. As a result, trucks would be expected to arrive during operating hours to drop and load containers.
- **Truck parking**: Trucks arriving before the facility gates open would be required to wait outside the gate, most likely parking on adjacent streets or in truck service centers that could open near-by. This increased truck traffic would likely be unwelcome for Lafayette and Elliston residents, and as a result adequate truck parking on the site (or in nearby truck service centers) would be recommended.

- **Impacts to mainline operations**: The facility would have a number of adjacent tracks for arranging trains and shipments and allowing enough track for the trains to pull off of the mainline at full speed; this allows for minimal disruption to the mainline operations.
- **Volumes**: The proposed facility would be capable of 15,000 lifts per year, expanding potentially to 30,000 lifts at some unspecified point in the future[21]. This lift volume is based on the market that NS believes they can capture in the region.

[21] DRPT, Roanoke Region Intermodal Facility Summary Report, 2008

Existing and Future Conditions Assessment

Western Virginia is a mountainous area with traditional strengths in the mining, furniture manufacturing, and textiles industries. A shiftshare analysis was performed for two specified regions to compare the local industry strengths to the United States (U.S.) in terms of employment. The two regions included a broader region, defined as the cities and counties within 200 miles of Roanoke, listed in **Appendix B**, and a core region defined as those within approximately 50 miles of Roanoke. The core counties are Alleghany, Craig, Roanoke Botetourt, Bedford, Franklin, Floyd, Montgomery, Giles, Patrick, Henry, and Pulaski counties.

When performing a shiftshare analysis, average annual employment data for 3-digit NAICS industry classifications from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages data was analyzed for 2001, 2009 and 2012 to derive three indicators that are of most use: economic growth, proportional shift, and differential shift. These three indicators compare the performance of a local economy to a larger reference economy; in this analysis the reference economy is the United States. Economic growth measures the aggregate employment changes in the reference economy between two years[22]. This indicator provides a snapshot that shows whether the economy is expanding, resulting in hiring of new employees, or contracting, resulting in layoffs. The proportional shift measures the employment within an industry in the reference economy as compared to the total employment of the reference economy[23]. This shows how an industry is performing compared to the overall economy. The differential shift measures the relative growth or decline of a local industry, as measured by employment, compared to that same industry's growth or decline in the reference economy[24]. This shows what industries are expanding or contracting in a particular region compared to the broader reference region. These three indicators provide a snapshot of the health of different industries in a region and show which are expanding and contracting the most.

A separate but equally important indicator was calculated to reveal the Location Quotient (LQ), a measure of the concentration of employment in a local economy as compared to that of the reference economy at a time. Location quotients will be greater than 1 for a local economy with a comparative advantage in an economic sector (i.e. an exporter), while it will be less than 1 for a local area with a comparative disadvantage in that sector (i.e. an importer). If a LQ is 1.1, it can be expected that the local economy has 10% more specialization within that industry than the region as a whole at that time.

As seen in **Exhibit 17** below, the broad region has had comparative strengths in the mining, textile mills, and furniture manufacturing industries as evidenced by the LQs being well over 1.0. While the textile mill and furniture manufacturing LQs have decreased since 2001, the mining industry is gaining strength.

[22] Landis, John D. (1985) 'Planner's Notebook: Electronic Spreadsheets in Planning The Case of Shiftshare Analysis', Journal of the American Planning Association, 51: 2, 216-224

[23] Ibid.

[24] Ibid.

Exhibit 17: Highest Location Quotients for the Broad Region, 2001, 2009, 2012

	Broad Region Location Quotient		
NAICS Code and Industry Name	2001	2009	2012
113 Forestry and logging	1.47	1.23	1.27
212 Mining, except oil and gas	2.93	2.91	3.04
236 Construction of buildings	1.43	1.31	1.28
238 Specialty trade contractors	1.38	1.37	1.36
313 Textile mills	5.70	4.35	4.18
314 Textile product mills	1.43	0.91	0.93
315 Apparel manufacturing	1.36	0.83	0.77
321 Wood product manufacturing	1.66	1.57	1.52
337 Furniture and related product manufacturing	2.45	1.90	1.79

Source: AECOM Analysis of Bureau of Labor Statistics Quarterly Census Employment and Wages (QCEW) Data

The economic growth factor of the region indicates that the regional economy grew by 3% over 2001-2009, while the greater U.S. economy shrunk by 1%. This is an indicator that the region is doing comparatively better overall by gaining employment faster than the overall country's economy. Looking at the differential shift, which shows the change in a regional industry compared to the same industry on the national scale, shows that the local strengths are in beverage and tobacco manufacturing, water, pipeline, and scenic and sightseeing transportation services, as well as educational services. One of the industries contracting the fastest is petroleum and coal products manufacturing; this is significant because it was a traditional strength in the region, but has been declining rapidly in past decades. **Exhibit 18** shows the regional and national economic growth factors, as well as the differential shift over 2001-2009 for industries with differential shifts greater or less than 0.5.

Exhibit 18: Regional vs. National Economic Growth and Differential Shift for the Broader Region for Select Industries

NAICS Code and Industry Name	Regional Economic Growth Factor 2001-2009	National Economic Growth Factor 2001-2009	Differential Shift 2001-2009	% Change in Employment 2001-2009
213 Support activities for mining			0.59	102.39%
312 Beverage and tobacco product manufacturing			0.60	50.69%
316 Leather and allied product manufacturing			1.96	145.24%
324 Petroleum and coal products manufacturing			-0.80	-85.54%
483 Water transportation			1.66	184.29%
486 Pipeline transportation			1.79	169.21%
487 Scenic and sightseeing transportation			0.61	46.84%
519 Other information services			2.12	267.01%
611 Educational services			0.53	65.13%
Grand Total	0.03	-0.01		

Source: AECOM Analysis of BLS QCEW Data

In addition to the broad region, LQs were calculated for a smaller set of core counties. As seen in **Exhibit 19**, the core counties have similar strengths as the broad region, but more industries are highlighted as strengths in the core counties. Industries that have grown over the three analysis years include forestry and logging, heavy and civil engineering construction, wood product manufacturing, merchant wholesalers, motor vehicle and parts dealers, building material and garden supply stores, truck transportation, postal service, food service and drinking places, and repair and maintenance. Of the industries analyzed, the strongest industries in the core counties are displayed in **Exhibit 19** below and include textile mills, wood product manufacturing, gasoline stations, nonstore retailers, and warehousing and storage. These local industries have nearly twice the concentration in employment when compared to that industry in the national economy, indicating strong local industry clusters.

Exhibit 19: Location Quotients for the Core Counties, 2001, 2009, 2012 for Select Industries

	Core Counties		
NAICS Code and Industry Name	2001	2009	2012
113 Forestry and logging	1.54	2.22	2.03
236 Construction of buildings	1.26	1.32	1.00
237 Heavy and civil engineering construction	1.72	1.77	1.90
313 Textile mills	6.31	2.24	2.50
321 Wood product manufacturing	4.50	6.18	6.35
327 Nonmetallic mineral product manufacturing	1.57	1.62	1.06
335 Electrical equipment and appliance mfg.	2.55	0.78	1.33
336 Transportation equipment manufacturing	1.58	2.15	0.51
337 Furniture and related product manufacturing	6.61	4.62	2.08
423 Merchant wholesalers, durable goods	1.02	1.27	1.40
441 Motor vehicle and parts dealers	1.53	1.69	1.84
442 Furniture and home furnishings stores	1.19	1.42	1.22
444 Building material and garden supply stores	1.20	1.57	1.85
445 Food and beverage stores	1.40	1.30	1.35
447 Gasoline stations	2.61	2.56	2.29
452 General merchandise stores	1.32	1.54	1.51
453 Miscellaneous store retailers	1.30	1.51	1.46
454 Nonstore retailers	3.01	2.01	2.27
484 Truck transportation	1.71	1.91	2.01
491 Postal service	1.45	1.56	1.70
493 Warehousing and storage	4.26	2.05	2.37
551 Management of companies and enterprises	2.08	2.02	1.95
722 Food services and drinking places	1.35	1.36	1.40
811 Repair and maintenance	1.46	1.52	1.54

Source: AECOM Analysis of BLS QCEW Data

The economic growth factor in the core counties indicates that the local economy shrunk by 6% over 2001-2009, a greater contraction than that of the overall US economy, which shrunk by 1%. This is an indicator that the economy of the core counties is performing comparatively worse overall by losing employment faster than the overall U.S. economy. It is also doing comparatively worse than the broad region, which has been gaining employment throughout the period. Several industries have contracted during the 2001-2009 period, including agriculture and forestry support activities, food manufacturing, warehouse storage, and publishing industries excluding the Internet. Alternately, some service industries in the region have posted gains throughout the period, with community and housing program administration and social assistance expanding the most. **Exhibit 20** shows the core county and national economic growth factors, as well as the differential shift for the 2001 to 2009 period for select industries that have differential shifts greater or less than 0.5.

Exhibit 20: Regional vs. National Economic Growth and Differential Shift for the Core Counties for Select Industries

NAICS Code and Industry Name	Regional Economic Growth Factor 2001-2009	National Economic Growth Factor 2001-2009	Differential Shift 2001-2009	Change in Employment 2001-2009
115 Agriculture and forestry support activities			-1.02	-100.00%
311 Food manufacturing			-0.81	-87.38%
493 Warehousing and storage			-0.67	-43.08%
511 Publishing industries, except Internet			-0.52	-73.47%
518 Data processing, hosting and related services			-0.51	-100.00%
523 Securities, commodity contracts, investments			2.26	223.91%
532 Rental and leasing services			0.51	32.51%
624 Social assistance			2.72	300.00%
924 Administration of environmental programs			0.62	61.86%
925 Community and housing program administration			5.31	523.08%
926 Administration of economic programs			0.62	85.04%
928 National security and international affairs			0.56	56.25%
Grand Total	-0.06	-0.01		

Source: AECOM Analysis of BLS QCEW Data

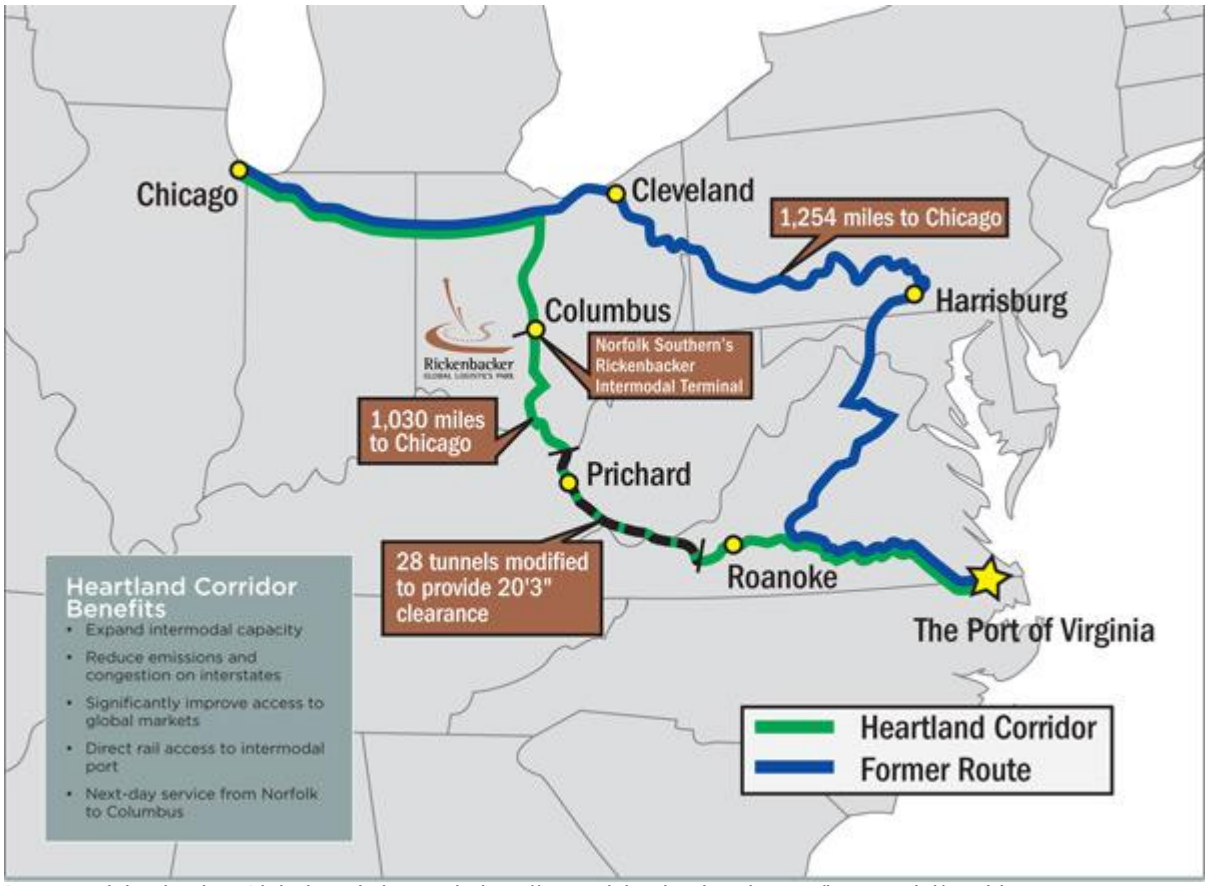
Heartland Corridor Initiative

The regional economy has been significantly impacted by the completion and operation of the Heartland Corridor Initiative. The Heartland Corridor Initiative is a program of improvements undertaken to improve rail conditions from the mid-Atlantic regions to the Midwest over NS's Heartland Corridor. These projects were implemented in the states of Kentucky, Ohio, Virginia, and West Virginia and include the following components:

- Central Corridor Double-Stacked Initiative
- Prichard Intermodal Terminal
- Western Virginia Intermodal Facility (formerly known as the Roanoke Region Intermodal Facility)
- Rickenbacker Intermodal Terminal
- Commonwealth Railway Mainline Safety Relocation Project

These projects are designed to increase the intermodal movement of goods through double-stacked rail freight, thus allowing for new or expanded rail freight capacity, a reduction in shipping costs via the Heartland Corridor, an improvement in mobility, and a reduction in emissions through the use of more efficient transportation modes. Prior to the implementation of this project, the Heartland Corridor could not accommodate double-stacked rail freight. The clearance improvements to the Heartland tunnels that now allow for the passage of double-stacked freight have significantly reduced the distance rail travels now compared to the rail routes previously traveled from the Port of Virginia to Chicago before the completion of the Heartland Corridor Initiative. **Exhibit 21** shows the improvements along the Heartland Corridor as well as the resulting reduction in travel distance from the Port to Chicago.

Exhibit 21: Heartland Corridor Benefits



Source: Rickenbacker Global Logistics Park, http://www.rickenbackerglp.com/intermodal/corridor.aspx

Federal funding is only available for the tunnel clearance projects. As a result, the Western Virginia Intermodal Facility must be funded with state, local, and/or private funds. In Virginia, NS funding has been focused on supporting tunnel expansion and the Western Virginia Intermodal Facility. The Commonwealth of Virginia supports these investments because it will shift freight traffic from its roads to rail, thus leading to fewer emissions, less congestion on its Interstates and roadways, less wear and tear on its pavement, and shorter routes for double-stacked rail freight. In addition, the Heartland Corridor is the primary intermodal rail corridor to connect the Port of Virginia to national markets. As a result, the state has dedicated funds from the Virginia Rail Enhancement Fund towards the tunnel improvements and the Western Virginia Intermodal Facility since at least 2008[25] that currently total $25 million today[26].

As part of this funding agreement with NS, DRPT requires explicit metrics of performance to be measured for each step of the project, or NS will need to reimburse a portion of the state's contributions[27]. The performance period on which the success of the Heartland projects in Virginia will be measured is the period beginning with the first complete calendar year after the completion and opening of the tunnels and/or the Western Virginia Intermodal Facility and finishing fifteen years afterward. These metrics include:

[25] Adams, Kathy, PilotOnline.com, "Montgomery County to sue to stop Norfolk Southern terminal," September 6, 2008, http://hamptonroads.com/2008/09/montgomery-county-sue-stop-norfolk-southern-terminal

[26] Kevin Page, DRPT

[27] Commonwealth of Virginia Department of Rail and Public transportation Multiple-Year Funding Agreement, Rail Enhancement Fund, Agreement Number 76506-01, Applicant Number: 06-001

- **Tunnel Improvements**: At least 150,000 additional Intermodal Units above a 2005 baseline must move via the Heartland Corridor within five calendar years after the completion of the Heartland Corridor. After the first five years, 150,000 additional Intermodal Units are expected annually for the remaining ten years of the performance period. For counting purposes, additional Intermodal Units will consist of all internal units passing in either direction through the tunnels improved through the work defined.
- **Western Virginia Intermodal Facility**: The lift-on or lift-off of an Intermodal Unit to or from a railcar or the placement of an Intermodal Unit onto or off of a railcar at the Western Virginia Intermodal Facility over the performance period. Each five-year increment will account for a predefined proportion of the total expected number of lifts[28] over the 15-year performance period. The first, second, and third 5-year incremental periods will account for 12.5%, 33.33%, and 54.17%, building up to the annual lift requirement by year 15.

The DRPT and NS will review and agree upon or renegotiate if necessary modifications to project benefits if:

1) The Commonwealth of Virginia decides to increase current truck size and weight rules as it pertains to over-the-road trucks
2) The Commonwealth of Virginia decides to allow for the flexibility on truck double-or-triple tandems on roadways in Virginia
3) The Federal Government imposes on Virginia the same requirements as (1) and (2)

It is expected that NS reports its performance relative to the expected performance on an annual basis. If NS fails to meet these expectations, DRPT is entitled to recovery as prorated over the performance period based on the percentage of the project benefit not achieved plus interest.

The DRPT will provide the appropriate funding based on the projected budget. It will be NS's responsibility to fund any costs above budget. However, they are permitted to revise the project so that total project costs do not exceed the project budget.

In addition, the DRPT has the right to reject any project budget or project schedule as a result of its own analysis that indicates that significant costs or schedule savings could be achieved through other contracting means that are in line with the quality and performance expected from NS.

If NS were to receive subsequent allocation(s) of funding from another source or federal funding applicable towards the proposed budget, the funds agreed upon by the DRPT will be reduced by the amount of subsequent allocations.

Lastly, if NS abandons or ceases to operate the improvements created by this project within the performance period, NS will reimburse the DRPT the value of its interest in the portion of the project abandoned or discontinued.

Both the DRPT and NS have the right to terminate the contract if either is determined to have materially breached the agreement.

Neither NS nor the DRPT is to be held responsible to the other for delays caused by Force Majeure Events and these delays will not be considered a breach or default under this agreement[29].

Freight Highway Network near the Western Virginia Intermodal Facility

Traversing the length of western Virginia from Tennessee to West Virginia, the I-81 Corridor is a critical link in the national freight transportation system and connects to it via several highway, rail, and airport

[28] The number of lifts was blacked out in the version of the Rail Enhancement Fund agreement provided.

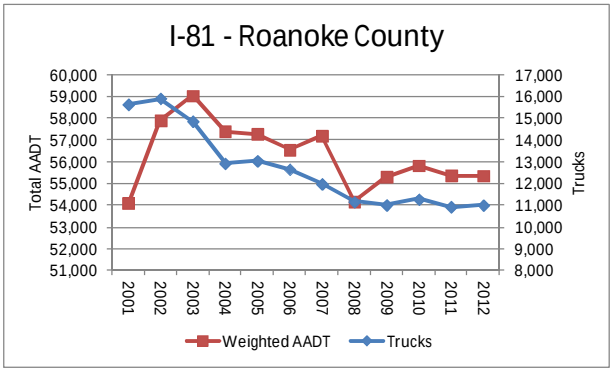
[29] Commonwealth of Virginia Department of Rail and Public transportation Multiple-Year Funding Agreement, Rail Enhancement Fund, Agreement Number 76506-01, Applicant Number: 06-001

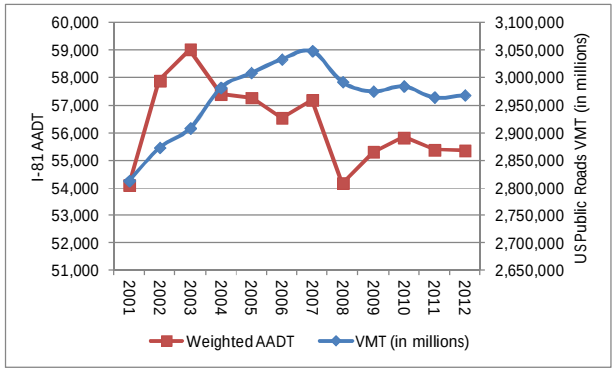
facilities, including I-64, I-66, I-77, U.S. 58, and U.S. 460; NS rail lines; and the Roanoke Regional Airport. Nearly 78% of tonnage moving within the I-81 Corridor is pass-through freight.

I-81 is a primarily four-lane limited access Interstate highway in western Virginia. Virginia maintains a statewide vehicle count program on its major highways, including collection and/or estimation of truck counts and percentages. I-81 is a primary through truck route along the East Coast. I-81 average annual daily traffic (AADT) varied from around 43,000 in Montgomery County to around 55,000 in Roanoke County in 2012. Truck volume is heavy on I-81 ranging between 20 and 25% of AADT.

Exhibit 22 below shows the average distance weighted AADT (all vehicle and trucks) since 2001 for I-81 in Roanoke County. The second plot in the figure compares the AADT for I-81 in Roanoke County with the nationwide VMT on public roads in the U.S.

Exhibit 22: Average Distance Weighted AADT for I-81 in Roanoke County





Source: FHWA, FAF

Traffic on I-81 near Roanoke dipped slightly during the past ten years, and heavy trucks did not gain any ground. The recent decline in traffic on I-81 could be due to several external factors including the 2008 recession, the ongoing construction delays due to bridge repair and addition of truck climbing lanes, and diversion to other roads. Nationwide, motorists are driving less as shown by the flat VMT on U.S. highways over past five years. Also, today I-81 operates at or near capacity in the Roanoke area, and as such does not have much available capacity to accommodate increased demand.

After the 2008 recession, the U.S. economy has stabilized in recent years and is expected to resume historic growth from this point forward. The demand for freight movement is also expected to continue to grow into the future. In the long term it is expected that with a growing economy and required capacity and infrastructure improvement completed along I-81, the traffic growth in I-81 corridor will resume.

Traffic Assessment

Route 11/460 and North Fork Road in Elliston-Lafayette are the major roadways connecting to the proposed Western Virginia Intermodal Facility site. In the study area, Route 11/460 has an average daily traffic of approximately 8,200 vehicles per day[30]; well within the capacity of a four lane roadway. Similarly, North Fork Road has an average daily traffic of approximately 1,300 vehicles per day[31] in the study area; well within the capacity of a two lane roadway.

The intersection at North Fork Road and Route 11/460 is the only major intersection near the proposed intermodal site. A quick overview of the 2009 traffic count data from the Virginia Department of Transportation (VDOT) indicates no major capacity constraints at his location. According to a recent

[30] Based on 2009 traffic count data from VDOT

[31] Ibid.

VDOT evaluation, there is currently ample capacity at this intersection and none of the movements, under typical traffic conditions, suffer from excessive delay or queuing[32]. The Lafayette Route 11/460 Corridor Plan also indicates that the roadway has sufficient capacity for current traffic volumes (8,000 vehicles per day) and future growth up to 40,000 vehicles per day[33].

While the capacity along these routes is sufficient, the Lafayette Route 11/460 Corridor Plan[34] highlights recommended road improvements to ensure a safe and efficient "eastern gateway" to Montgomery County. The projects include the Route 603 (North Fork Road) – Elliston/Ironto Connector, which will provide two 12-foot travel lanes with 8-foot shoulders (5-foot paved) with retaining walls and provide a better connection between Route 11/460 and Interstate 81 at exit 128 – one of two interchanges serving the proposed intermodal facility site. This project is estimated to cost approximately $21 million dollars. The contract was awarded in May 2014 and completion is expected in two years.

The Western Virginia Intermodal Facility is projected to add 18 truck trips per peak hour and 235 truck trips per day by 2020 to the roadway network. It is estimated that 70% of the traffic from the facility will travel to the Ironto exit (at I-81), with 20% traveling east along Route 11/460 and 10% traveling west along Route 11/460[35]. Most of the traffic to and from the proposed intermodal facility is expected to be short haul trucks, bringing freight to and from the facility. As a result of the proposed intermodal facility, long haul trucks on highways surrounding the study area will be reduced.

VDOT's assessment of the traffic impacts for the intermodal site location concluded that the estimated truck traffic generated by the intermodal facility should present little to no impact to the surrounding roadways.

Literature Review Summary

The literature review was designed to leverage the significant body of existing work on the Western Virginia Intermodal Facility, state freight and rail plans, regional freight and transportation plans completed to date, and broader intermodal literature. The review of these studies and plans helped identify existing, readily available data in regards to potential users and freight volumes associated with a Western Virginia Intermodal Facility, current and forecasted freight flows in the region and Virginia, and issues and factors that could affect the use of the center.

Prior studies indicated that a facility in the Western Virginia region was infeasible due to low volumes (Wilbur Smith, 2003) and then subsequently that a facility was beneficial to the region (HDR, 2008), though the benefits calculated did not consider a facility as an individual economic driver, but rather combined with the other elements of the greater Heartland Corridor program. Since the last Western Virginia intermodal center studies were completed in 2008, the economic and freight conditions surrounding the facility have continued to evolve, painting a different context for the intermodal center than has been studied previously. Some of the most notable changes include:

- The economic recession's impact on freight movements and Norfolk Southern.
- The investment in the Crescent Corridor, including new intermodal terminals in Charlotte, NC and Greencastle, PA, starting in 2008.
- The opening of the Heartland Corridor in 2010.
- Forecasted growth at the Port of Virginia associated with the expected completion of the Panama Canal expansion in 2015.
- The State of West Virginia's groundbreaking on the Prichard intermodal facility 2013.
- A growing emphasis on national freight corridors.

[32] Cited from Lafayette Route 11/460 Corridor Plan, March 2012
[33] Ibid.
[34] Ibid.
[35] Ibid.

- This is a comparatively small facility as designed and it would predominately serve the local export market. Low volume terminals have a harder time maintaining customers if train frequencies are below three per week and competing for containers as ocean carriers prefer to supply higher volume facilities. However, there is precedent for a small facility to grow and evolve, as evidenced by the Virginia Inland Port at Front Royal.
- Evolving market focus among local shippers.

Similarly, much of the data provided in the statewide and regional freight studies is based on 1998 and 2004 TRANSEARCH data, which will not account for the impacts of the economic recession and the opening of the Heartland Corridor and Crescent Corridor improvements on freight movements in the region. While these older data provide important insights into the types of commodities, origins, and destinations, the volumes and values of these flows have likely been significantly impacted by the changing economic and freight conditions. As a result, the volumes and values of freight originating, destined, and traveling through the Western Virginia region will need to be supplemented with additional data, volume, and value data collected from 3rd party sources such as the Freight Analysis Framework (FAF3). In addition, regional economic changes and freight needs will need to be validated and updated through workshops with manufacturers, shippers, distribution centers, truckers, logistics companies, and regional economic development and planning professionals. Interviews will also be conducted with Norfolk Southern, CSX, and the Port of Virginia to determine how the economic and freight conditions have impacted their business forecasts and intermodal needs in the Western Virginia region. These workshops and interviews will provide essential input into the potential use and demand for an intermodal facility in the Western Virginia region.

For the full Literature Review, see **Appendix C**.

Stakeholder Outreach

Focused discussions with industry stakeholders is a key component in identifying specific companies that have current and projected needs for an intermodal facility, as well as issues and factors that may affect the use of the facility or create obstacles to its market feasibility. In order to gain this understanding, the team used an interactive process to involve regional planners and key freight stakeholders throughout the development of the study. The information obtained from shippers and industry representatives was critical to accomplishing the objectives of this study. In this section, the process and takeaways of the stakeholder outreach efforts are described.

Workshops

In order to understand the potential market and outlook for an intermodal facility in Western Virginia, a series of workshops were conducted in Roanoke. A variety of stakeholders were invited to the five workshops in an effort to collect information on their needs, volumes, anticipated utilization, and suggestions on how the facility could work if it were constructed. In addition, the stakeholders provided insight into what would happen in the region if the investment is not made – the opportunity cost – and how their businesses could be affected. The workshops were an opportunity to gauge the level of interest of the local industries in the project and the necessity of it. Opinions varied on the degree to which the facility was necessary, as well as the anticipated utilization and prospective industrial growth it might support. This section summarizes the structure of the five workshops, the attendees, the main takeaway points from the discussions, and the supplemental information provided by the attendees.

Stakeholders

Five workshops were conducted with the goal of obtaining input from a variety of stakeholders on the intermodal facility and its market feasibility. Having five workshops organized by stakeholder type allowed the project team to present the information on the study to all groups while customizing the questions and discussions for the specific stakeholders. The five workshops had attendees representing the following stakeholder groups:

1. **Economic development professionals and regional planning officials**: These attendees could share what they have heard from their constituents in regards to the facility, as well as help identify businesses that have shown interest in the area or facility, concerns they may have, and what would happen if the facility were not built. These attendees have a higher level understanding of the needs of the rest of the stakeholder groups and could help the project team ask the right questions of the remaining stakeholder groups and help identify the right people to invite to the remaining workshops or interviews.
2. **Distribution centers**: The second workshop included Managers and Directors of Operations of distribution centers in the region. Also invited were representatives who were unable to attend the first workshop, site selection professionals, and local officials familiar with the Foreign Trade Zone (FTZ) at the New River Valley Airport.
3. **Truckers, carriers, and logistics centers**: The third workshop consisted of truckers and logistics center personnel. These stakeholders have knowledge of customers, freight flows, and volumes in the region, as well as pricing information. While the facility would present competition for longer routes, it would also provide steady volumes of freight for short-hauls to and from the region.
4. **Shippers and manufacturers (two workshops were held for this group)**: The fourth and fifth workshops were aimed at the actual shippers and manufacturers who produce the goods that could utilize the facility. These stakeholders would be able to share how the facility would affect the volumes that they consume and produce, how the outlook for imports or exports might change, and what shipping routes they would use the facility for (if any).

In the following sections, the process of inviting attendees and the methodology behind selecting the invitees is discussed.

Invitations

Invitations went out in several batches in order to ensure high attendance at the workshops. A letter was drafted on behalf of the Roanoke Valley-Alleghany Regional Commission (RVARC) and DRPT. The letter introduced the project and AECOM as the consultant leading the study on behalf of RVARC and DRPT. The letter went on to explain that there would be a series of workshops to which they would be invited and they would be asked to share information on current and projected needs of the facility as well as any issues or factors that might affect their use of the facility, create obstacles to its market feasibility, or have effects on the broader community.

The letter was sent as an attachment to an email with more information about the specific workshop to which the invitee's presence was requested. The emails were sent to contacts at each company or firm based on information shared by the project's Study Committee, found online, or through phone calls requesting names and email addresses. Stakeholders were also advised to share the invitation and project background information with others in their company or firm who would be valuable to the discussions at the workshop.

Finally, the invitees were sent an email meeting invitation to a workshop through Outlook. The invitation contained the workshop date and time, as well as the location and directions to the AECOM offices in Roanoke where all five workshops were held. The invitation included contact information for the AECOM team so that attendees could ask questions in advance. A series of reminder emails and phone calls were sent to invitees to encourage them to accept an invitation.

The next sections describe the methodology followed when compiling the lists of potential stakeholders to invite to the workshops. The section concludes with a map showing the locations of the workshop attendees **(Exhibit 23).**

Economic Development Professionals

The list of stakeholders invited to the first of the workshops was compiled primarily from the regional agencies' online directories. First, the members of the project's Study Committee were included. These consisted mostly of Directors of Economic Development from the nearby counties, directors of nearby Economic Development Commissions, and groups representing special coalitions. Representatives from the following counties, cities, towns, coalitions, and agencies were invited:

Counties

- Bedford
- Botetourt
- Craig
- Floyd
- Franklin
- Giles
- Montgomery
- Patrick
- Pulaski
- Roanoke

Cities and Towns

- Blacksburg
- Christiansburg
- Lynchburg
- Roanoke
- Salem

Coalitions and Agencies

- Alleghany Highlands Economic Development Corporation
- Blacksburg Partnership
- DRPT
- New River Valley Metropolitan Planning Organization (MPO)
- New River Valley Planning District Commission
- RAIL Solution

- I-81 Coalition
- Martinsville-Henry County Economic Development Corporation
- New River Valley Airport
- New River Valley Economic Development Alliance
- Roanoke Regional Partnership
- RVARC
- Virginia Economic Development Partnership
- Virginia Tech Office of Economic Development

Distribution Centers
The list of distribution center representatives came from a number of sources. First, during the course of the literature review, lists and maps of distribution centers in the region and state were used to compile lists of nearby companies. In addition, lists of the top employers in the cities, towns, and counties of the region were obtained from the agency websites, and distribution centers were noted. Finally, attendees at the first workshop and the Study Committee provided the project team with suggestions for companies and contacts to include in the subsequent workshops.

The list of distribution centers was then divided into categories based on the types of products. The goal was to get representatives from a wide variety of product types, time sensitivities, and distribution networks. The categories included clothing/textiles/shoes, third party fulfillment centers, retail/electronics/toys, food, and others. From these lists, invitations were sent to:

- Advance Stores
- Backcountry.com
- Bacova Guild Ltd.
- Bausch & Lomb/Valeant Pharmaceuticals
- Best Buy
- Elizabeth Arden
- GSI Commerce/EBay
- Orvis
- Peebles
- Tetra Holdings
- Wal-Mart

Based on low interest after phone calls and reminder emails, the list was expanded to include those who could not attend the first workshop for economic development professionals, site selection professionals, and representatives from the New River Valley Airport, Foreign Trade Zone, and the Virginia TradePort.

The site selection agencies were invited because they have an understanding of where clients are looking to locate in the region and would be able to share the criteria that companies prioritize when looking for new locations. Site selection companies invited included:

- Austin Consulting
- Crawford Commercial Real Estate Services, Inc.
- Cushman & Wakefield/Thalhimer Commercial
- F A Johnson Consulting Group, Inc.
- Hall Associates
- Poe & Cronk
- Walker Commercial Services, Inc.

Truckers, Carriers, and Logistics Centers
The list of representatives from trucking companies and logistics centers came from the same sources as the distribution centers; primarily, the lists of the top employers in the cities, towns, and counties of the region were obtained from the agency websites, and truckers, carriers, and logistics centers were identified. In addition, the attendees at the first workshop and the Study Committee provided the project team with suggestions for companies and contacts to include.

The list was then divided into categories based on the size and reach of the company. The goal was to get representatives from a variety of company sizes and regional familiarity, because they would have the

largest breadth of knowledge about where goods are going and the transportation issues associated with different routes. The categories included local/regional, national, and logistics/other. From these lists, invitations were sent to:

- Allegheny Logistics Services
- Americold Logistics
- Camrett Logistics
- Con-Way Southern Express
- Cundiff Trucking, Inc.
- DB Schenker
- Estes Express Lines
- FedEx Freight
- Hipage/Livingston International
- Howell's Motor Freight, Inc.
- JB Hunt
- Lawrence Transportation Systems
- Old Dominion Freight Line
- Sullivan Logistics
- Virginia Trucking Association

Shippers and Manufacturers

The list of representatives from shippers and manufacturers came from the same sources as the distribution centers and truckers workshops; primarily, the lists of the top employers in the cities, towns, and counties of the region were obtained from the agency websites, and companies that created final products were noted. In addition, the attendees at the first workshop and the Study Committee provided the project team with suggestions for companies and contacts to include.

The list was then divided into several categories based on the type of good(s) that the company manufactures and ships. The goal was to get representatives, ideally plant managers or shipping managers who would be familiar with the transportation of goods, from a variety of companies and types of products. These representatives would be able to share a range of experiences and needs for their shipments, particularly volumes of inputs and outgoing finished products, where their markets are located, and how an intermodal facility might affect the company long-term cost structure and growth. The categories identified included food, chemicals, lumber/wood products, vehicles and vehicle parts, furniture, textiles, associations, glass/windows, and other. Because of the large number of invited firms, two workshops were scheduled for this group. Invitations were sent in a number of iterations to:

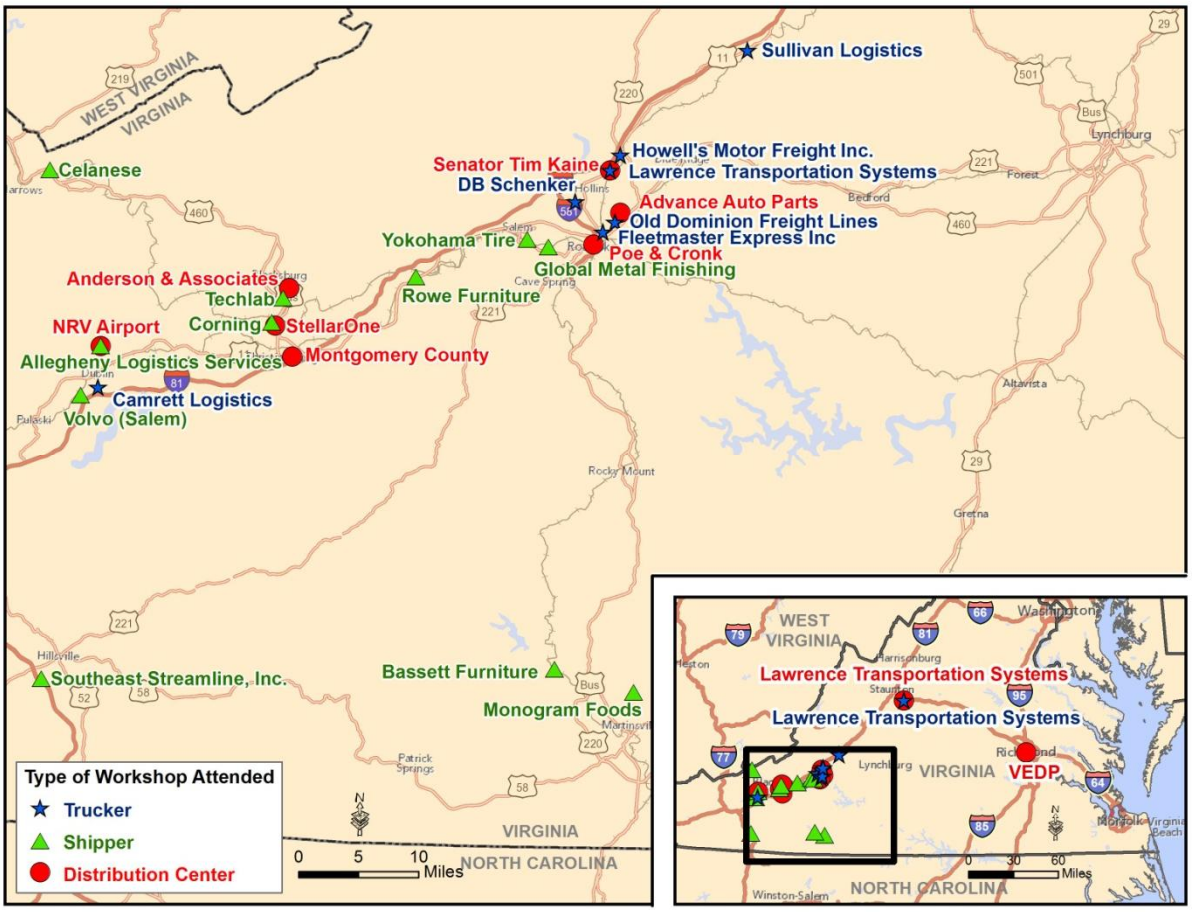
- American Import Shippers Association, Inc.
- BAE Systems
- Bassett Furniture
- Bedford Products
- Blue Ridge Fabricators, Inc.
- Bondcote
- Capco Machinery Systems, Inc.
- CEI
- Celanese Acetate
- Chateau Morrisette
- Chemical Lime (Lhoist)
- Cobham, Collegiate Pacific
- Conwed
- Cooper Crouse-Hinds
- Corning Glass Works
- Federal Mogul Corporation
- Furniture Shippers Association
- Glass Association of North America
- Luna Technologies
- Maple Leaf Bakery
- Monogram Food Solutions
- Moog Components Group
- Nanosonic
- Oak Hall Industries
- Pepsi Bottling Group
- Phoenix Packaging
- Ply Gem Windows
- Precision Fabrics Group, Inc.
- Quality Manufacturing
- Renaissance Contract Lighting
- Rowe Fine Furniture
- SEMCO
- Shaw Industries
- Shenandoah Furniture
- Steel Dynamics
- Techlab

- Global Metal Finishing
- Graham White Manufacturing Company
- Griffith Lumber, Hopkins Lumber Contractors
- Goodyear Tire and Rubber Company
- Hollingsworth & Vose
- Hooker Furniture Corp, Inc
- Hoover Color
- Infoseal, Premium Steel
- James Hardie Building Products
- Ten Oaks, LLC
- Virginia Forest Products Association
- Virginia Manufacturers Association
- Virginia Transformer Corporation
- Volvo
- Walker Machine & Foundry
- Wolverine Advanced Materials/Eagle Picher
- Yokohama Tire Corporation

Workshop Attendees

Exhibit 23 below shows the spatial distribution of the workshop attendees and the workshop they attended.

Exhibit 23: Workshop Attendees



Source: AECOM GIS

Workshop Format

The workshops were conducted at the AECOM office in Roanoke and were centered on a handful of discussion questions that would elicit stakeholder opinions on their current and forecasted shipping patterns and volumes, potential utilization of the facility, what complementary services or industries would benefit the facility and other shippers, and any impediments to the facility's long-term success. Attendees were welcomed to a conference room with a "U" shaped table setup to encourage discussion, as seen in **Exhibit 24**.

Exhibit 24: Typical Workshop Setup

Source: AECOM/RVARC

Workshops began with introductions of the client and consultant teams and then the participants. A short PowerPoint presentation was given to highlight the history of the study and region as well as some information on competing intermodal facilities, projected freight traffic in the region, and industry strengths. From there, the main topics were covered, including:

- Client/customer/firm/agency/business needs
- Shipping and distribution patterns
- Intermodal facility needs
- Changes to shipping needs and patterns
- What if it does not get built?

Meanwhile, attendees were invited to voice their individual experiences, concerns, volumes, and at times pricing information. They also helped recommend documents that would inform the study and other stakeholders who would be interested in the facility. Halfway through the questions, the participants were offered a short break before resuming the remainder of the discussion. Upon completion of the workshop, attendees were invited to share other information with the consultant team by phone or email. In addition, many attendees took the opportunity to network with others in their industry and exchange contact information.

Workshop Surveys

A paper survey was distributed to each stakeholder that attended the last four workshops, as well as electronically to all stakeholders invited to Workshops 3, 4, and 5. The survey contained questions about the primary function of the business, routes primarily served, annual container volumes, commodity types, usage of the Port of Virginia, effects of hours of service constraints, advantages and disadvantages of locating in the Western Virginia region, and any other considerations that should be included in the study.

The surveys were not widely completed. In total, one was completed for Workshop 2, eight were completed for Workshop 3, and five for Workshop 4.

Workshop Findings

A total of five workshops were conducted in Roanoke, and there were a number of findings that were consistent across the five groups. These findings can be broadly broken down into four topics, as discussed below.

Facility. Respondents felt that a number of features were needed at the facility in order for it to function well. There would need to be parking along the access roads for trucks waiting outside of the gate. Respondents noted that if parking is not provided, localities get frustrated because trucks park in the streets and block intersections, causing congestion. In addition, container storage is desirable for containers that are full and empty. It was noted that the area has too many empties and nowhere to send them, so a container pool would be beneficial for users. Chassis storage would complement container storage, and some respondents noted that chassis can be harder to come by than containers. If a third party ran the container or chassis pool, they could also offer tires, breaks, and truck repair services. Shippers felt that a 24-hour operation was an absolute necessity.

Another facility question is who would own and operate it. Suggestions ranged from NS to the Port of Virginia or a third party economic development agency. In addition, the facility could function as, on the simple end, an intermodal facility, or could expand potentially to support a larger operation by functioning as an inland port. There was no indication of needing a Foreign Trade Zone (though the area is already covered by the existing FTZ at the New River Valley Airport), customs, or refrigerated storage, though having a FTZ could be attractive for new firms.

Competition. Competition came into play in two ways – pricing and distance. A number of respondents voiced that having one rail operator in the area would only push down prices to just below trucking prices because there is no rail competition for NS, whereas the trucking industry has a lot of competition in the region which helps keep prices down. Rail should be a more efficient way to ship, but shippers only see rail prices that are priced just below trucking. With the intermodal facility in place, there is concern that shippers will have the choice of using NS or paying to dray to CSX. The fear is that, because draying is expensive, NS will price just below the cost to dray to CSX, and local shippers will have fewer choices for rail.

The opportunity for the facility to serve both the Crescent and Heartland Corridors could provide an interchange and open up numerous markets for shippers, thereby increasing the competition for long-haul truckers. The long-haul trucking industry could be pushed out if rail pricing is better, but the facility would provide an opportunity for more competition in the shorter dray trucking industry for trips to and from the facility. Also noted was the shift from the trucking industry from longer hauls to shorter hauls due to lifestyle changes of drivers and hours of service restrictions. It is harder to attract employees to the long-haul trucking lifestyle, and the existing pool of long-haul truckers is aging rapidly and there will soon be a shortage of these truckers.

Finally, an important factor in competition is the distance to the Port of Virginia from the Western Virginia region. Rail is typically competitive with truck for distances of approximately 500 miles[36] or more, so trucking to the Port will remain the most viable mode outside of subsidies and large concentrated volumes. However, rail can be more competitive for goods to and from Western Virginia and the rest of the western U.S., if there is a market.

Risk. The risk of building or not building the facility was discussed, as well as the risk of further conflict with Montgomery County. From many points of view, stakeholders believe that NS will not build the facility unless there is market demand, and the lack of the facility is an indicator of the demand in the region. In addition to the perceived lack of demand, participants felt that NS may have a disincentive to build the facility because of the performance measures that are in place once it opens for business. The risk of having to pay back a portion of the state's capital funding is enough to keep NS from building the

[36] The range varies, but 500 miles is a common rule of thumb.

facility. Another factor is that the nearby highways are not going to be finished until 2016, and participants felt that could be contributing to NS's hesitation of building the facility. The unfinished highways could also be discouraging businesses from locating in the region. No one knows how many companies looked at the Western Virginia area for a site but ultimately left because inquiries were not formally made. Inquiries were strong after the intermodal facility site was announced, but declined with the litigation that ensued.

Another risk of the facility is the inherent risk of rail timing. Many shippers currently rely on truck to get to and from the Port of Norfolk, and putting goods on rail to or from the Port is a reliability risk because rail takes longer than truck. Respondents noted that goods traveling by rail fall into a "black hole" while in transit, and as a result rail is only a viable mode for goods that are not time sensitive. If there are issues at the Port, you can usually resolve trucking issues with money, but rail does not have that option. It is more of a pipeline where shippers cannot intervene.

Finally, there are risks of continued conflicts with Montgomery County. The intermodal facility is not complementary to their Comprehensive Plan so there may need to be rezoning on adjacent parcels, and the county has not been supportive of that. The past litigation between the county and the state effectively halted construction and caused NS to reconsider locating a facility in such a contentious location. Another risk to consider is that while Montgomery County may get the physical facility, another county could get the ancillary buildings and complementary services due to the lack of properly zoned land and adjacent sites. This is of concern to Montgomery County because they would have assumed the environmental and traffic risks of the facility, while the majority of the tax benefits locate in adjacent counties.

Economic Growth. The economic growth that could be attracted is largely associated with the type of facility and ancillary businesses that would come, but respondents felt that the volumes could grow beyond previous study forecasts like they have at other intermodal facilities like Greensboro, Front Royal, or Greencastle. They acknowledged that Front Royal evolved from its original purpose, which was to divert container traffic from Baltimore. The extent of growth of ancillary buildings and businesses at Front Royal was not planned, as indicated by the adjacent golf course.

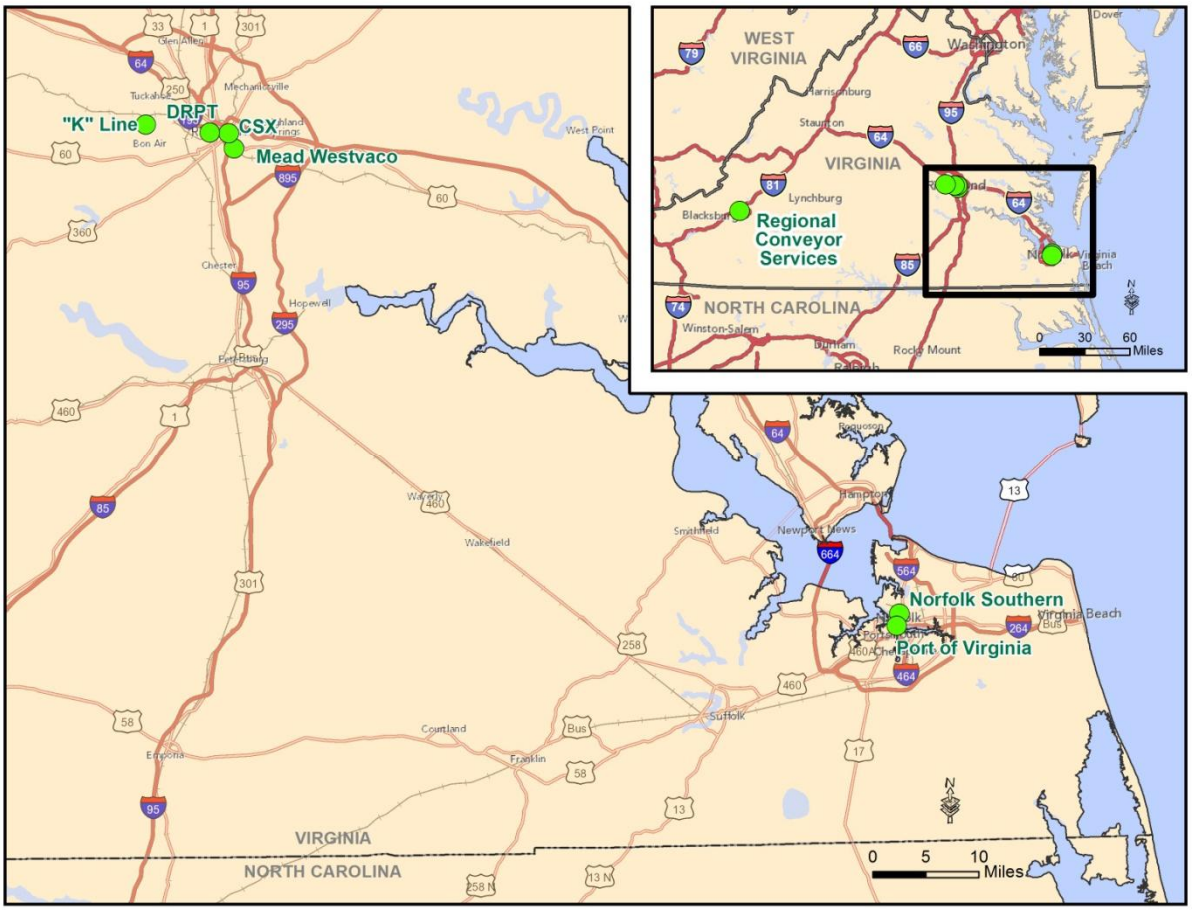
Shippers noted that there is a movement for industry to be located closer to its consumer base and for the customer to be able to customize goods quickly. With the Western Virginia region having a smaller market compared to the market serving Front Royal, it will likely attract fewer companies. The issue with rail is that just-in-time shipments are not feasible, and since shippers need guaranteed windows for deliveries, truck will continue to be the most reliable mode for these deliveries. If rail could be more reliable and consistent as well as lower-priced, then more shippers would use it.

Volumes from the Panama Canal opening are the big wild card, but shippers indicated that if the volumes increase significantly at the Port of Virginia, then the Port may need some help with sorting and distributing containers and Western Virginia could fill that need.

Interviews

A second method of stakeholder outreach used to understand the potential market and outlook for an intermodal facility in the Western Virginia region was interviews. A variety of stakeholders were invited to participate in the interviews in order to get more detailed information on their needs, volumes, anticipated utilization, and suggestions on how the facility could work if it were constructed. The interviews were an opportunity to speak directly with stakeholders about their specific needs and the facility's outlook in a more personalized setting. A total of eight interviews were conducted for the study in-person or through conference calls. Most of the interviewees were recommended by workshop attendees or other interviewees. The summaries presented here outline the interviews and the main takeaways from each. A map of the locations of the interviewees is shown in **Exhibit 25** below.

Exhibit 25: Locations of Study Interviewees



Source: AECOM GIS

Norfolk Southern

The interview with NS was conducted on February 18, 2014 by conference call. NS owns and operates the tracks adjacent to the proposed facility, and as a result has traditionally been considered the most likely candidate for constructing and operating the intermodal facility. The intermodal facility was originally estimated by NS to cost about $36 million in 2008 to construct, but that price is outdated. NS provided an updated estimate of the facility totaling about $71 million and outlined the reasons for the cost increases. The increase in price is for the same facility type and size as the original estimate (36 acres, 15,000 lifts, and containers only), but additional lead track was included in order to keep trains from causing conflicts on the mainlines of the Heartland and Crescent Corridors. In addition, an increase in the cost for realigning Cove Hollow Road was included. As a result of these additions to the project and the increase in costs over time, the project cost increased substantially to $71 million.

NS also provided some analysis of routes that they determined would be the most competitive for the facility to service. Those routes included Norfolk, Columbus, and Chicago. However, because of the short distances between Western Virginia and Norfolk and Columbus, those routes would likely only be competitive with truck pricing if there were incentives or large concentrated volumes. The eastbound route from Chicago to Western Virginia is the more preferable route because of its ability to compete with truck pricing, while westbound from Western Virginia to Chicago is anticipated to have higher pricing than truck at this time.

Another important topic of conversation was whether NS had planned on using the intermodal facility to interchange traffic between the Crescent and Heartland Corridors. In workshops it had been suggested that the interchange would provide higher volumes and also provide service to more destinations to the northeast and southeast. However, NS indicated that the two corridors are operated differently, with Heartland being an international corridor and Crescent serving domestic markets. As a result, NS does not plan for the facility to be a place to interchange trains or volumes between the two corridors.

Finally, NS believes that the facility would compete for volumes with its closest neighbors including intermodal facilities at Greensboro and the upcoming Prichard location.

A letter supporting these conclusions was shared with the study team.

MeadWestvaco

The interview with MeadWestvaco (MWV) took place on March 3, 2014 by conference call. The company operates two locations in Western Virginia, including Covington (mill) and Raphine (warehouse), and they primarily handle wood and wood pulp products. In the past, MWV had conversations with NS and CSX about potentially partnering as an anchor user at an intermodal facility near their locations, but not at the Elliston site specifically. MWV hoped to send containers to the Port of Norfolk as an export, but they were never able to get NS on board. Another issue is that their mill is directly on rail, but it is CSX track, so the movement of switching from CSX to NS would not be likely to have a competitive rate with truck. A big component for the operation was how to get the empties back to Western Virginia.

MWV felt that there is good capacity at the Port for exports and have not experienced any chassis issues. They use JB Hunt to dray to rail usually at Charlotte or Harrisburg. Their goods are not time sensitive and they export domestically and internationally. MWV indicated that if the facility were constructed, they would dray to the Western Virginia Intermodal Facility and use it for as much of their volume as possible. However, their business would not change with the facility, because they are not constrained currently by distribution. The facility could impact some of their trade lanes that are all truck currently, but wouldn't change much else.

Gatorade

The interview with Gatorade was conducted on March 3, 2014 by conference call. Gatorade operates a distribution center in Wytheville, Virginia. They get very little inbound containerized traffic, but have potential for outbound from the facility using 53' containers. Mostly shipping to Indianapolis, shipments are not time sensitive and cost is more important. Gatorade does mostly domestic shipping and the few imports they get in use New York. They have not experienced any issues with trucks and chassis, but containers have been an issue.

Gatorade would use an intermodal facility in Western Virginia, and they believe the plant could double in size as a result of being able to get more production lines working. The limiting factor is the lack of trucks, so an unlimited access to containers at the Western Virginia Intermodal Facility would be beneficial and they would ship seven days a week. They believe the facility would allow for a more even inbound and outbound flow of containers. They believe the dray to the Western Virginia Intermodal Facility would encourage short-haul truckers to come to the area and would provide good jobs that allow truckers to be home at night. The location in Wytheville was chosen because of the access to water, incentives from the state and county, and adjacent space for their bottle supplier. If the Gatorade plant were able to double production, the adjacent bottle supplier could also double production, providing even more jobs in the region.

CSX

The interview with CSX was conducted on March 31, 2014 by conference call. The goal of the interview was to discuss the impacts, if any, of the intermodal facility on CSX's operations, as well as to ascertain their opinion of the potential markets and viability of a facility in Western Virginia. The interviewee

acknowledged the challenge of the location in relation to the Port of Virginia, because it may not be far enough away for the port to support rail on its own and may require a subsidy. In general, he thought about 500 miles was the ideal distance for rail to be competitive with truck, but volume is a big factor as well. He has never seen it work for less than 250 miles without a subsidy for rail.

An ideal site would have a 10,000-ft rail yard with three or four tracks in order to not need to break trains. Good truck access is necessary, and I-81 has high volumes so that is complementary; in addition, there is not a direct route from Western Virginia to the Port by highway, so that helps the prospect of rail in the region. He also indicated that the site should have the following components:

- Storage for chassis, because those can be hard to find;
- Good staging space for inbound and outbound trucks; and
- A long driveway for queuing trucks to keep them off of local streets will keep the local residents happier.

CSX felt that the facility would be a benefit to everyone, because it would attract more shippers and encourage development of rail-served sites. It would help the local economy and improve industrial development in the region, which has been lacking. The interviewee felt it would provide competition and reduce truck prices, so even those who do not use rail would benefit.

DRPT

The DRPT interview was held on April 4, 2014 in-person in Richmond. The interview focused on the state's funding contribution to the facility and whether the facility makes sense. DRPT has $25 million ready for the project, and they think that NS could stop the Crescent trains for an interchange. The interviewee believes that, because the haul is short, the railroad will need financial assistance from the state or the Port. There was a question of how an intermodal facility at Knoxville makes sense and Western Virginia does not, when they are a similar distance from the Port. The possibility of a subsidy from the state was mentioned, but it was unknown whether it is possible.

It is believed that NS will not invest in the facility because of the payback risk and the unknown volumes. Because the market is not there, building the facility is a risk at this time. It was suggested that the market has changed and that the Western Virginia Intermodal Facility could function in the same way as the Virginia Inland Port, by pulling containers from the Port and creating clusters of distribution centers.

Port of Virginia

The Port of Virginia interview was held on April 15, 2014 in-person in Richmond. The largest conclusion gathered from the interview was that the Port of Virginia is prepared for the anticipated increase of cargo with Post-Panamax ships, but the Panama Canal widening is not a revolutionary change. The Port hopes to gain some business, but at this point they have no estimate of how much that might be. Because the Port has deep water, they are in good position to gain the largest ships. The interviewee believes that they will continue to serve as the first-in/last-out stop when vessels are fully loaded. Seeing record growth over the past two years, the Port expects to continue this trend as the Panama Canal opens because of the depth and their ability to handle the 9,000+ TEU ships fully loaded.

The Port believes that, even if NS is not going to be the owner or operator of the intermodal facility, they will need to realign their rail network to make it a place for trains to stop. The impact of the Knoxville facility was questioned because of its close proximity to Western Virginia; Greensboro was mentioned as competition as well, though it may be showing its age. In addition, the proximity of Prichard reduces the need for a facility in the Western Virginia region. However, the capacity at Greensboro may be a factor that necessitates a facility like the Western Virginia Intermodal Facility.

The question of a possibility of a subsidy was referred to the Virginia Secretary of Transportation, as the state already has two inland ports (Port of Richmond and the Virginia Inland Port). The support for such a subsidy is unknown, but there may not be enough support for a third state-owned facility.

The Port has had strong growth over the past couple of years, in part because New York and New Jersey ports had problems with Hurricane Sandy. Shippers had to divert to Norfolk and have stayed. Norfolk handles 35% of cargo on rail now, which is the highest share on the East Coast. A facility in the Western Virginia region would not help the Port unless NS stops trains there, which would be up to the ocean carriers and the rail lines.

The Port interviewee wondered if perhaps NS was still hesitant to build in Montgomery County because of the political atmosphere, but felt sure that this is not a "build it and they will come" situation. In other words, the ocean carriers and NS must make agreements for this facility to work. Finally, NS may be convinced if a large anchor tenant were dedicated to using the facility.

"K" Line

The interview with "K" Line was conducted on May 8, 2014 by conference call. "K" Line is an ocean carrier recommended by the Port of Virginia. Ocean carriers have agreements with rail lines to move shipments between points. "K" Line does have agreements with NS, including service to Norfolk. The agreements do not specify the routes, but rather specify the end points at contracted rates. The Western Virginia Intermodal Facility would not have an effect on the volumes that "K" Line handles through the Port of Virginia, unless it had a negative impact on rail service levels. Most likely, it would not be economically viable to rail into that area because of the short distance to the Port and the small market. "K" Line does not have significant volumes going to Roanoke today. The size of the market is the greater issue than the distance to the Port, but the interviewee would expect truck to remain the most viable option. To the interviewee's knowledge, "K" Line has not had inquiries for services between Roanoke and the Port.

Regional Conveyor Services

The interview with Regional Conveyor Services (RCS) was conducted on May 19, 2014 by conference call. RCS is based in Salem and was referred to the project team as a potential facility user. The company has three divisions including conveyor sales, machine and fabrications, and industrial supplies. They manufacture industrial equipment and serve customers in the mid-Atlantic and beyond. RCS does not currently have outbound shipments and the company does not use another intermodal facility. They primarily use FedEx or UPS for shipments but also do LTL containerized shipments. Their shipments are infrequent, with about 15 to 18 containers annually. With the facility, it is unclear how RCS's operations would change. However, since they use freight forwarders, if the facility helped prices decrease due to greater competition of the modes, then perhaps their business could expand and employ more workers. There is even potential for outbound shipments in the future, if the company grows enough.

Existing and Future Freight Flows

Existing Market Conditions

To establish the existing freight demand in the Western Virginia area, data were collected via stakeholder interviews and workshops (as described in the Stakeholder Outreach section). Based on stakeholder outreach, nine stakeholders around the planned Western Virginia Intermodal Facility that either ship or receive goods were identified as potential primary users of the facility: Gatorade, MeadWestvaco, Bassett Furniture, Yokohama, Corning, Monogram Foods, Celanese, Volvo, and Rowe Furniture. Shipment volumes data obtained from interviews and surveys were assembled into a summary matrix and standardized to twenty-foot equivalent units (TEUs). Only the freight flows that have the potential to divert to rail at the Western Virginia Intermodal Facility were considered to establish the existing freight demand.

For the analysis, the shipment volumes were split into freight flows along four corridors: Heartland Corridor West, Heartland Corridor East, Crescent Corridor Northeast and Crescent Corridor Southeast. Heartland West carries traffic going to, from, or through Chicago or Columbus. Heartland East carries traffic going to or from Norfolk. Crescent Northeast carries traffic going to, from, or through Pennsylvania. Crescent Southeast carries traffic going to, from, or through Southeastern cities like Charlotte and Atlanta, as well as Knoxville and Memphis. Traffic was assigned to the corridors based on information on the origin of incoming or destination of outgoing shipments that was obtained through stakeholder outreach. The Heartland and Crescent rail corridors are shown in **Exhibit 26**.

Exhibit 26: Rail Freight Corridor near Roanoke

Source: AECOM GIS

The candidate corridor freight demand was also split up into inbound and outbound flows in relation to Western Virginia for each corridor, creating a total of eight markets. **Exhibit 27** below summarizes the current candidate freight demand for each market and by shipper.

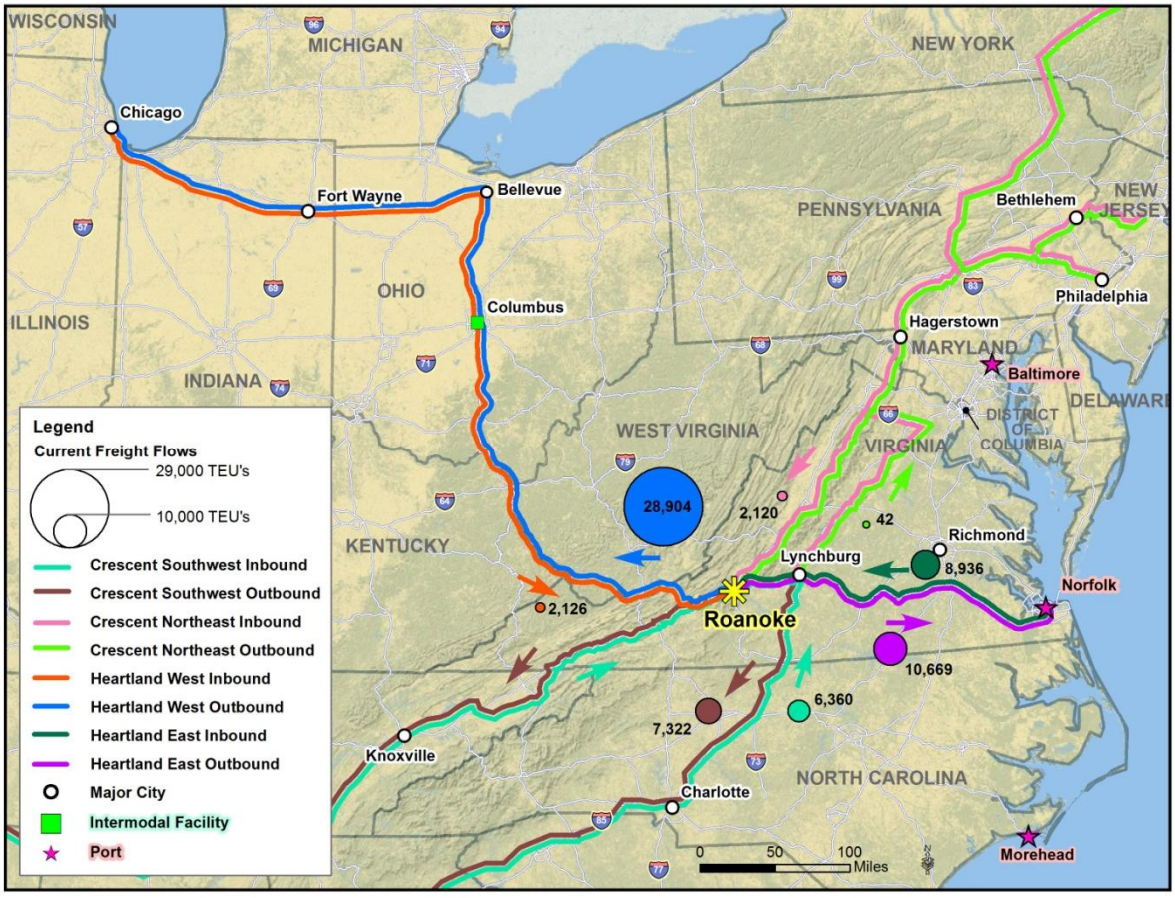
Exhibit 27: Existing Candidate Freight Demand by Market (in TEUs)

Stakeholder	Heartland West		Heartland East		Heartland Total	Crescent Northeast		Crescent Southeast		Crescent Total
	In-bound	Out-bound	In-bound	Out-bound		In-bound	Out-bound	In-bound	Out-bound	
Gatorade	2,120	24,513			**26,633**	2,120		6,360	6,625	**15,105**
MeadWestvaco		3,600			**3,600**				400	**400**
Bassett Furniture			5,000		**5,000**					
Yokohama		595			**595**				255	**255**
Corning		90		45	**135**		42		42	**84**
Monogram Foods	6	6			**12**					
Celanese			3,000	10,000	**13,000**					
Volvo			936	624	**1,560**					
Rowe Furniture		100			**100**					
Total	**2,126**	**28,904**	**8,936**	**10,669**	**50,635**	**2,120**	**42**	**6,360**	**7,322**	**15,844**

Source: AECOM Analysis of Stakeholder Reponses from Workshops

Exhibit 28 illustrates the existing freight demand by market along the Heartland and Crescent Corridors for the Base Case. The outbound flow along Heartland West is the largest market for existing primary stakeholders in the Western Virginia area. The inbound and outbound flows along Heartland East comprise the second largest market. The Crescent Corridor has relatively lower candidate flows for the Western Virginia Intermodal Facility. Overall, the flows in the outbound direction from Western Virginia represent the largest market potential due to the strong presence of the manufacturing industry and producer nature of the regional economy of Western Virginia.

Exhibit 28: Current Freight Flows (in TEUs)



Source: AECOM GIS and AECOM Analysis of Stakeholder Responses from Workshops

Today, truck is the primary mode for freight movement in the Western Virginia area. However, there is interest among shippers to utilize the Western Virginia Intermodal Facility and rail for some of their freight movement needs. Some shippers' needs are better met by rail than by truck; other shippers' needs are better met by truck than by rail. If rail can offer improved cost, reliability, and speed versus trucking, then some share of trucks could be expected to divert to rail. However, it is not expected that all trucks potentially capable of diverting to rail would actually do so due to following limiting and influencing factors:

- Rail can only divert traffic that is going to and from places that are relatively close to where the railroad goes, otherwise truck shipping costs at each end become prohibitive;
- Certain commodities are time or motion sensitive, or require special handling;
- Traditional technologies capture only intermodal trucks – containers and dry vans;
- Speed of rail travel results in more effective service for longer distance travel;
- Fuel prices and highway level of service;
- Rail capacity; and
- Overall health of the economy.

Future Market Conditions

In order to estimate the potential demand that will utilize rail, it was critical to establish the relative competitiveness of the rail. Based on information provided by NS, there are no concrete operational plans finalized for level of service at the Western Virginia Intermodal Facility.

For the Base Case forecasts, initial operational assumptions for the Western Virginia Intermodal Facility were based on DRPT's Roanoke Region Intermodal Facility Summary Report (2008). For initial operation it is assumed that NS would operate two intermodal trains per day–one eastbound for the Port of Virginia and one westbound from the Port toward Columbus, Ohio and Chicago, Illinois. Of these two trains, blocks of containers on double-stack rail cars destined for the Western Virginia Intermodal Facility would be placed at either the front or the back of the train, so that they could be quickly identified and removed from the train. Similarly, any block of rail cars or containers to be placed onto the train for further transport to the train's final destination would be loaded. Other intermodal trains without cars for Western Virginia will simply pass through the area as they do today. In the report, NS predicts that two trains per day would likely suffice for the first ten years of the operation with additional blocks of cars on each train to handle the increase in containerized freight. At some point in the future, additional trains would be needed.

For planning purposes, it is assumed that the intermodal site would initially operate Monday through Friday, from 7AM to 7PM. As the demand increases in the future, the hours might increase to 16 hours per day. The initial capacity of the facility is assumed to be approximately 15,000 lifts per year. A lift is defined as an intermodal trailer or container lifted onto or off a rail car. For calculating the size of an intermodal facility, lifts are used to determine the length and number of tracks. At some point in the future, the full-build capacity is expected to be 30,000 lifts per year.

Considering the limiting factors identified previously and the operational plan assumed above, rail mode shares for a Base Case were determined for each shipper based on the corridor they are likely to use. Additional considerations included were:

- According to NS, the outbound rail shipments to Chicago and Columbus are not competitive with truck service based on current gasoline prices. Therefore, a 10% capture is assigned to outbound flows from Western Virginia on the Heartland Corridor.
- Inbound rail shipments from Chicago and Norfolk are more competitive; therefore, inbound capture was set at 50%.
- The Western Virginia Intermodal Facility will only serve the Heartland Corridor; therefore, capture of traffic along the Crescent Corridor was set at 0%.

Shares for some shippers were tailored based on their interview responses:

- MeadWestvaco has a rail line spur connecting to the CSX line. This makes it unlikely that it will be a major user of Heartland Corridor served by NS; therefore, its outbound share was set at 5%.
- Celanese requires clean containers for their shipments; therefore, their inbound share was set at 25% and outbound at 10% due to potential container availability limitations.
- Monogram foods indicated that about one quarter of in-bound freight would shift to rail.
- Advanced Auto Parts suggested that if Heartland Corridor were operational, they would no longer need to haul freight to the Western Virginia area and would load the containers at Norfolk for destinations in the Midwest. Only the shipments for local and regional distribution would be off-loaded at the Western Virginia Intermodal Facility. As a result, the share for Advanced Auto Parts was assumed to be 0%, due to insignificant market potential for the Western Virginia Intermodal Facility.

Exhibit 29 summarizes the rail mode share for the Base Case. Gatorade had the largest share, at 12% or 3,511 incoming and outgoing TEUs, followed by MeadWestvaco at 8% or 2,500 incoming and outgoing TEUs, and Celanese at 6% or 1,750 incoming and outgoing TEUs. Other shippers had minimal utilization, based on the information that was gathered from the stakeholder outreach efforts.

Exhibit 29: Base Case Rail Mode Share

Stakeholder	Heartland West		Heartland East		Crescent Northeast		Crescent Southeast	
	In-bound	Out-bound	In-bound	Out-bound	In-bound	Out-bound	In-bound	Out-bound
Gatorade	50%	10%			0%		0%	0%
MeadWestvaco		5%						0%
Bassett Furniture			50%					
Yokohama		10%						0%
Corning		10%		10%		0%		0%
Monogram Foods	25%	10%						
Celanese			25%	10%				
Volvo			50%	10%				
Rowe Furniture		10%						

Source: AECOM Analysis

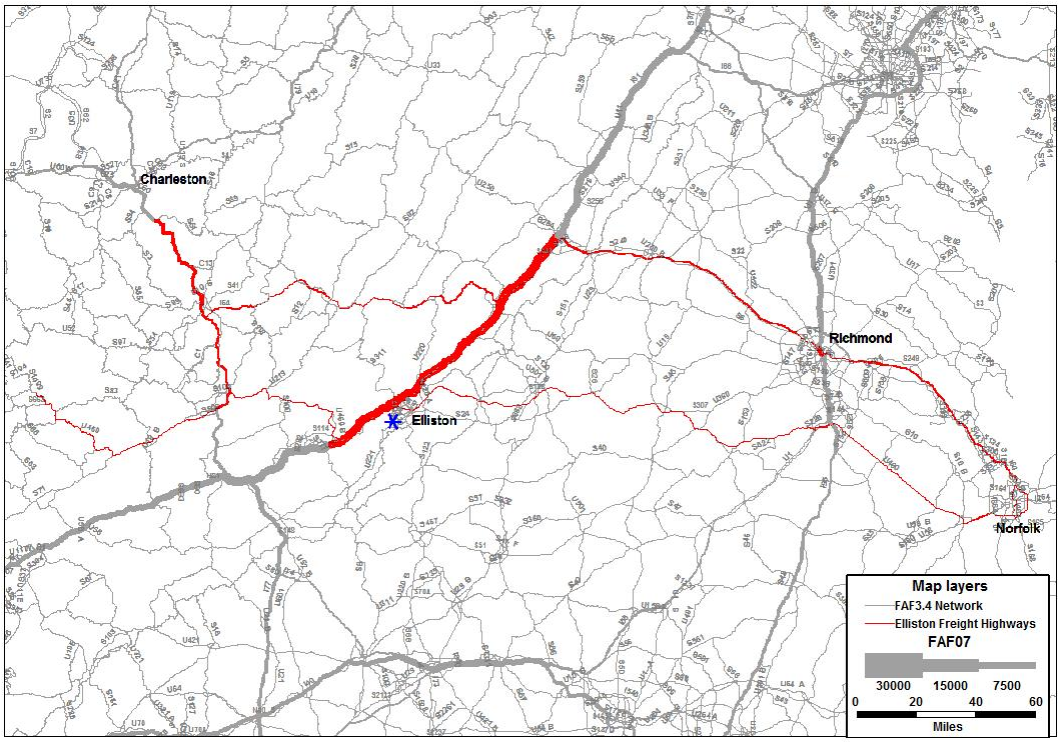
The initial capacity of Western Virginia Intermodal Facility is assumed to be 15,000 lifts per year. This equates to a capacity of 30,000 TEUs per year, assuming double stacking of containers (or the use of 40-foot containers). For the Base Case, the existing freight demand results in utilization of 29% or 8,557 TEUs

To establish the future freight flows, the growth in freight traffic from the Federal Highway Administration's (FHWA) Freight Analysis Framework 3.4 (FAF3.4) is considered. **Exhibit 30** and **Exhibit 31** show the freight flow volumes for 2007 and 2040 from FAF3.4. The highway networks shown in red are considered to establish the growth in freight traffic for the Western Virginia region. As shown in the exhibits, the majority of freight traffic is carried by I-81. Between 2007 and 2040, the freight traffic on I-81 is expected to grow at a rate of 2.3% per annum. The growth in freight traffic for other highways in the Roanoke area is lower. Overall, when freight traffic on all relevant freight highways serving the Western Virginia Intermodal Facility are considered, the annual growth rate from 2007 to 2040 from FAF3.4 is 2.0% per annum.

The I-81 Corridor Improvement Study Tier I EIS (2005) shows that vehicle traffic will grow at a rate of 1.7% to 2.1% annually. The actual growth rates used in the EIS vary by segment within this range, and assume that heavy trucks will grow 2.8% annually. The Virginia Statewide Multimodal Freight Study, Phase I (2008) anticipated that Virginia truck volumes over the entire system would increase by 115% between 2004 and 2035, corresponding to an average annual growth rate of 2.0%, based on year 2004 TRANSEARCH data.

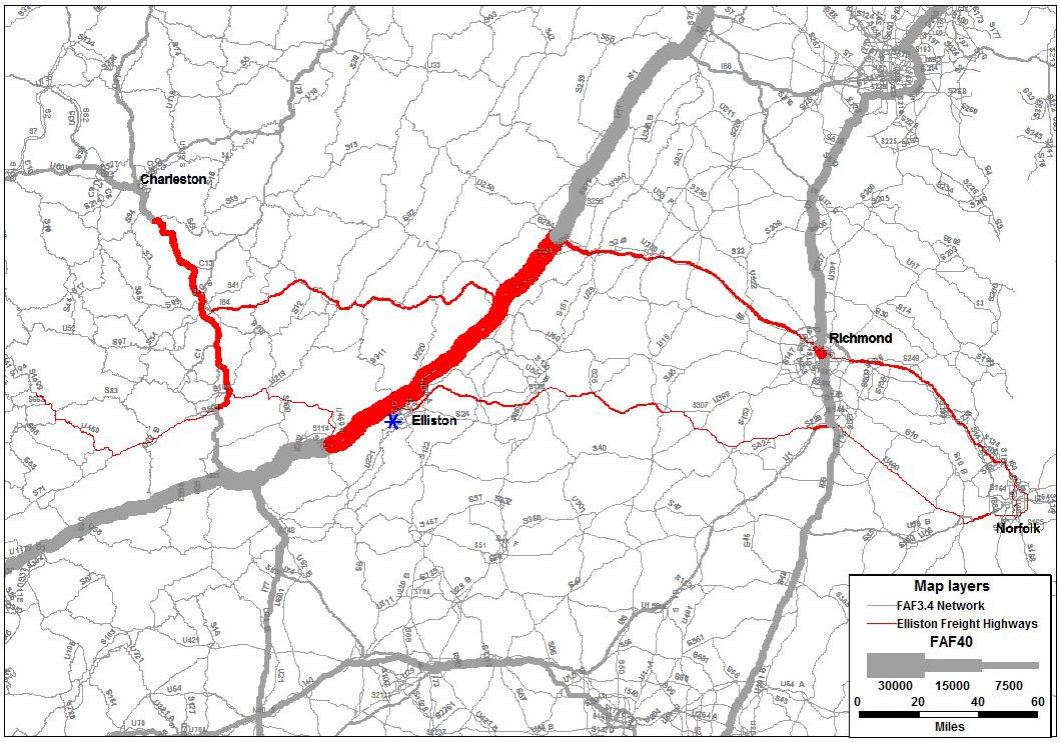
Based on the analysis of observed growth in truck traffic on I-81 over the past decade and the markets that will potentially be served by the Western Virginia Intermodal Facility, this study adopts the growth rate of 2.0% per annum (based on FAF3.4 for the highways highlighted in **Exhibit 30** below) for the Base Case scenario.

Exhibit 30: Year 2007 Freight Flows from FAF3.4



Source: AECOM using FAF3.4 data

Exhibit 31: Year 2040 Freight Flows from FAF3.4



Source: AECOM using FAF3.4 data

Exhibit 32 summarizes the Base Case forecasts by market for the Western Virginia Intermodal Facility. For the Base Case assumptions, the facility is expected to be utilized at one third of its capacity by year 2020, reaching close to half the capacity utilization by year 2040.

Exhibit 32: Base Case Freight Forecasts for the Western Virginia Intermodal Facility

Year	# of TEUs			% Utilization
	Heartland West	Heartland East	Total	
2014	3,772	4,785	8,557	29%
2015	3,848	4,881	8,729	29%
2016	3,925	4,979	8,904	30%
2017	4,004	5,079	9,083	30%
2018	4,085	5,181	9,266	31%
2019	4,167	5,285	9,452	32%
2020	4,251	5,391	9,642	32%
2021	4,337	5,500	9,837	33%
2022	4,424	5,611	10,035	33%
2023	4,513	5,724	10,237	34%
2024	4,604	5,839	10,443	35%
2025	4,697	5,957	10,654	36%
2026	4,792	6,077	10,869	36%
2027	4,888	6,199	11,087	37%
2028	4,986	6,324	11,310	38%
2029	5,086	6,451	11,537	38%
2030	5,188	6,581	11,769	39%
2031	5,292	6,713	12,005	40%
2032	5,399	6,848	12,247	41%
2033	5,508	6,986	12,494	42%
2034	5,619	7,127	12,746	42%
2035	5,732	7,270	13,002	43%
2036	5,847	7,416	13,263	44%
2037	5,965	7,565	13,530	45%
2038	6,085	7,717	13,802	46%
2039	6,207	7,872	14,079	47%
2040	6,332	8,030	14,362	48%

Source: AECOM Analysis

Considerations for Developing Market Scenarios

Exhibit 32 established the potential utilization of the Western Virginia Intermodal Facility for the Base Case scenario using the conservative growth and operating assumptions for the primary potential users identified in the region. In order to fully realize the market potential of the intermodal facility, the following additional assumptions should be considered when developing the various market scenarios:

- **Competitiveness in outbound direction**: Based on information obtained from NS and an independent review of the truck rates by lane, only the inbound flow to the Roanoke area is considered competitive for rail share. As a result, conservative shares were assigned to the Western Virginia outbound flows in the Base Case. However, other incentives and subsidies offered by the state in the early years of operation could increase the competitiveness of rail in

the outbound flows from Western Virginia. Since the majority of the potential flows from the Western Virginia area are in outbound direction, a market scenario with competitive service being offered in both directions of traffic flow should be considered.

- **Connection with Crescent Corridor**: Based on the information provided by NS, the Western Virginia Intermodal Facility is not expected to serve the Crescent Corridor, as NS has invested significant amounts of capital to improve the speeds along this corridor, and stopping in Western Virginia would reduce these gains. However, there may be a potential for certain markets in the Crescent Corridor to be served by the Western Virginia Intermodal Facility, and this operating policy from NS could be revisited if conditions warrant. The primary potential users identified in the Western Virginia area show some demand for the Crescent Corridor, which could potentially be served by Western Virginia Intermodal Facility.
- **Capture of freight flows from I-81 traffic beyond the Roanoke area**: The Base Case only considered the freight demand generated by the primary potential users in the region. With the growing congestion along I-81, some shippers beyond the Roanoke area may consider using the Western Virginia Intermodal Facility for certain markets. The 2009 study by the state "Feasibility Plan for Maximum Truck to Rail Diversion in Virginia's I-81 Corridor" showed the potential to divert up to 230 trucks per day from I-81. While some of these diverted trucks are already accounted for in the Base Case and some of these trucks would divert only if infrastructure improvements to rail are made throughout the I-81 corridor, there still might be a potential to capture freight flows from I-81 traffic beyond the Roanoke area.
- **Accelerated near term growth rate**: The Base Case assumed a conservative growth rate of 2% per annum. An accelerated near term growth could be achieved due to the opening of the Western Virginia Intermodal Facility, particularly due to:
    - New distribution and/or manufacturing facilities
    - Increased volumes from existing facilities (diversion)

  A market scenario with accelerated growth in the near term could be considered, with the long term growth rate still approaching 2% per annum.
- **Operating assumptions**: The Base Case assumes limited initial operation and level of service at the Western Virginia Intermodal Facility, including one freight train per direction each weekday. Since time savings and reliability are critical for capturing market share, a more aggressive operating assumption with greater flexibility to shippers could be tested as a market scenario.

Market Scenarios Tested

This section defines the four market scenarios developed to analyze varying volumes of usage, costs, and revenues that could occur at the Western Virginia Intermodal Facility. The assumptions used to develop the scenarios are based on the Market Scenarios Workshop held with the study's Study Committee and the Base Case demand estimated in the previous section.

Description of Key Assumptions that Define the Scenarios

The market scenarios analyzed in the study were developed during a workshop on May 14, 2014 in Roanoke. At the workshop, a brief presentation of the study background and results to-date was presented, and then the variables that would comprise the assumptions for the scenarios were defined. The variable descriptions and ranges were distributed to the attendees before the workshop and can be found in **Appendix D**. An abbreviated overview of the variables analyzed is presented here, followed by the definition of the scenarios developed at the workshop with the attendees as shown in **Exhibit 33**.

Variables Considered

There were four main variables considered in the analysis: cost, type of facility, routes, and volume/users. The definitions of the four variables and the suggested ranges are described here, as they were presented to the attendees at the Market Scenarios Workshop. These variables and the ranges were designed to be a starting point for developing the market scenarios that would define the Benefit Cost Analysis (BCA) to be performed for the study.

Cost

The cost of the facility is a major input in the BCA because it, in conjunction with the O&M cost, is the denominator that all of the benefits are compared to. Small changes in the cost of the project or schedule of construction can result in variations in the benefit cost ratios. The facility was originally estimated to cost $36 million in 2008, but that figure has increased with time. Also to be considered is the possibility of using state and/or local grant funding to offset some of the initial investment cost.

The suggested range of the cost variable was between $71 million (per the latest NS estimate) to $79 million (per the original AECOM independent estimate). Please note that the AECOM independent estimate was $79 million at the time of the Market Scenario Workshop, but was adjusted to $77.5 million later in the study.

Type of Facility

The type of facility considers capabilities that will be part of the functionality of the facility. For example, the site has been planned as 65 acres with approximately 3,000 feet of intermodal track. These are constants as the site is space-constrained. However, based on the stakeholder workshops, feedback supported considering a variety of other functions or services. The type of facility determines the volume of containers that the facility can process and influences the market capture of the facility. As market capture increases, so do the facility's operating costs.

The suggested range of the facility operation variable was from an "as is" facility on the low-end, to an "inland port" facility on the high end. The "as is" scenario represents how the facility has been envisioned for years. It would consist of 65 acres with minimal storage for chassis and containers, no services on-site, and would be operated by NS. In the mid-range, the "logistics center" type of facility would again be on 65 acres, but would dedicate some space on-site for container and chassis storage. The facility could be operated by NS or a third party and assumes an approximate market share increase of 10% above the Base Case due to the additional functionality. Finally, an "inland port" facility would again be on 65 acres, but would dedicate some space on-site for container and chassis storage and also be a FTZ subzone with customs on-site. The facility would be operated by a Port Authority, either the existing Authority or one formed for this purpose, and assumes an approximate market share increase of 20% above the Base Case.

Routes
The routes served are considered. Based on the workshop and interview feedback, NS felt that the markets that would be the most competitive for their operations would be Western Virginia/Chicago and Western Virginia/Columbus. This is because there are large distribution centers in Columbus, and Chicago opens up access to western markets. In addition, they are far enough from Western Virginia for truck to be less competitive. Unless gas prices rise substantially, NS felt that these are the markets where they could operate successfully.

The suggested range of the variable was:
- serving primarily the West Virginia/Chicago routes, as NS states
- serving as a regional hub for regional markets while still serving the Western Virginia/Chicago routes as well as the Crescent Corridor,
- serving Norfolk as another distribution center for national markets; it would open trade routes for the West Coast destinations and West Coast Ports, while still serving the Western Virginia/Chicago routes.

Volume/Users
This variable considers both the volumes that go through the facility as well as the users of the facility, because they are inherently related. The Type of Facility variable also influences the volume and users. This variable provides ranges for the volumes expected and the number of lifts assumed at the facility. It also considers the proximity of the primary shippers that it serves. It is important to note that, per stakeholder feedback, demand for the facility would serve mostly exports (outbound from Western Virginia).

The suggested range of the variable was for low, medium, and high utilization (lifts) of the facility.
- On the low end, the Panama Canal (PC) opens to limited use and the intermodal facility operates below expectation with only 5,000 lifts per year. It primarily serves the local shippers that dray to and from the site.
- In the mid-range, the Panama Canal opens to its expected level of use and so does the facility – 15,000 lifts per year. The facility primarily serves the local shippers that dray to the site, and also attracts regional distribution centers. The scenario assumed two anchor tenants use the facility and it attracts a new firm that also increases volumes.
- Finally, the high range would assume that the Panama Canal opens above its expected level of use and so does the facility. The facility serves the local shippers that dray to the site and the regional distribution centers, but primarily serves its largest anchor tenants. The anchor tenants have regular shipments between Roanoke and the Port, as well as locations to the west.

Market Scenarios Workshop
The four scenarios developed at the Market Scenarios Workshop are outlined in **Exhibit 33** below. They considered the pre-established variables described above and also added the variable of highway use.

Exhibit 33: Scenario Assumptions Developed at the Workshop

Scenario	Cost (Capital and Operating Subsidy)	Type of Facility	Route	Volume/ Growth	Use of 64 and 77, 58, 73, 81
1 Most Optimistic (Identified Shippers Represent 20% of Market)	$79M + (complementary services)	Truck facilities, FTZ	Heartland + Crescent; may include dray connection	Volume increases using Greencastle as basis for growth increase: general ramp-up in growth. PC opens and overwhelms Port	Volume, truck traffic switches to rail
2 Optimistic (Identified Shippers Represent 40% of Market)	Scale the subsidy to cover funding gap	Storage of chassis, mid-range facility	Heartland Only	Captures 5,000 TEUs from other facilities + HOS and EPA regulations changes structure of trucking industry to increase rail	Half the difference of Scenario 1
3 Pessimistic (Identified Shippers Represent 40% of Market)	Scale the subsidy to cover funding gap	Storage of chassis, mid-range facility	Heartland Only	Captures 5,000 TEUs from other facilities	Half the difference of Scenario 1
4 Most Pessimistic (Identified Shippers Represent 80% of Market)	$79M; scale subsidy	"As is"	Heartland Only	PC makes no difference	Makes no difference

Source: Market Scenarios Workshop
Note: The $79M cost was adjusted after the workshop to $77.5M based on an updated estimate.

These scenarios were used as a starting place for the analysis. Because each variable had a number of assumptions built-in, the assumptions were included to fit the scenarios as nearly as possible. After the workshop, the scenarios were further developed and the assumptions were shared with the Study Committee in order to obtain their approval to proceed with finalizing the analysis. The high level assumptions that the Study Committee was invited to comment on are seen in **Exhibit 34** below. Additional notes on the scenario assumptions were sent to help the Study Committee understand their development and use:

- Scenarios allow the study to consider a range of assumptions and think through the inherent uncertainty of future projections.
- The notation “X% rep by nine firms” means that each scenario assumes a different percentage of the total market is represented by the nine firms who chose to give detailed information during the interview process. For example, Scenario #4 assumes that 80% of the entire potential market is represented by the total volume of those nine firms; conversely, Scenario #1 assumes that only

20% of the market is represented by those same firms with Scenarios #2 and #3 weighing in at 40% and 60%, respectively. This allows the study to see how the viability of the facility changes depending on how much of the total market demand is assumed to be represented by the stated demand of the nine firms.

- For subsidies, the idea is to calculate each scenario at break-even and see if there is a gap between revenue and costs. If there is a gap then that "gap" will be the subsidy required. This way analysis does not have to assume a particular subsidy beforehand; rather, it will see if and how much of a subsidy will be needed for each scenario.

It was also noted that the utilizations were just starting points and as the analysis was finalized those percentages might vary based on other assumptions changing.

Exhibit 34: Scenario Assumptions for Study Committee Approval

Scenario	Cost (Capital and Operating Subsidy)	Volume/ Growth/Use of Highways
1 Most Optimistic (Identified Shippers Represent 20% of Market)	$79M capital cost allocated over 30 months based on NS's estimate. O&M assumed at $1.5M per year, based on NS range. Assumes complementary services are constructed and operated by others.	Assumes Heartland and Crescent volumes in 2017 have the facility operating at full capacity throughout the analysis period. Annual growth is based on CAGR of volumes using highway routes of current shippers. Distances used for VMT-based benefits (emissions, safety, pavement, congestion, and shipper savings) based on draying a container one-way to other intermodal facilities.
2 Optimistic (Identified Shippers Represent 40% of Market)	$79M capital cost allocated over 30 months based on NS's estimate. O&M assumed at $1.0M per year, based on NS range.	Assumes Heartland only volumes in 2017 have the facility operating at ~88% capacity and increasing to full utilization by 2048. Annual growth is based on CAGR of volumes using highway routes of current shippers and is half of that in Scenario 1.
3 Pessimistic (Identified Shippers Represent 40% of Market)	$79M capital cost allocated over 30 months based on NS's estimate. O&M assumed at $750k per year, based on NS range.	Assumes Heartland only volumes in 2017 have the facility operating at ~64% capacity and increasing to ~84% utilization by 2048. Annual growth is based on CAGR of volumes using highway routes of current shippers and is half of that in Scenario 1.
4 Most Pessimistic (Identified Shippers Represent 80% of Market)	$79M capital cost allocated over 30 months based on NS's estimate. O&M assumed at $500k per year, based on NS range.	Assumes Heartland only volumes in 2017 have the facility operating at ~36% capacity and increasing to ~41% utilization by 2048. Annual growth is based on CAGR of volumes using highway routes of current shippers and is half of that in Scenarios 2 and 3.

Source: AECOM
Note: The $79M cost was adjusted after the workshop to $77.5M based on an updated estimate.

No feedback was received from the Study Committee; as a result, the analysis moved forward with no adjustments to the assumptions except for updating the capital cost estimate to $77.5 million from $79 million based on an updated AECOM independent estimate.

Market Scenarios Analysis

With the high-level assumptions for the variables set, the technical analysis of the four scenarios could begin. In this section the more detailed assumptions that contributed to the analysis are described. In addition, the results of the analysis in terms of benefits and costs, and then the overall implications for three owner scenarios are discussed.

Volumes and Routes

The volume of container traffic is the variable driving the benefits of the analysis. The assumptions included in this analysis are described here for each of the four scenarios. In order to estimate the volumes that the facility could handle, the Base Case was used (as described in the previous section). The Base Case included Heartland Eastbound and Westbound volumes totaling 8,557 equivalent TEUs in the current year (2014). Escalating by approximately 2% per year, the Base Case volume for Heartland-only in opening year (2019) is 9,454 TEUs. As developed in the Market Scenarios, this Base Case volume represents 20%, 40%, 60%, and 80% of the expected market capture in Scenarios 1 through 4, respectively. These volumes create the basis of each scenario, with some additional adjustments as described below.

An assumption utilized in all four scenarios is that the facility can handle 15,000 lifts per year, and that all lifts are 40-foot containers. As a result, the facility is capped at handling 30,000 equivalent TEUs per year throughout the 30 year analysis period (2019-2048). The facility may expand to be able to handle 30,000 lifts per year at some point, but because there is no set timeframe for that expansion, the facility is assumed to be able to lift 15,000 containers maximum per year.

In addition to the volume of containers, the highway routes used by various volumes were estimated. The Market Scenarios Workshop participants requested the inclusion of a variable accounting for growth in highway traffic. The purpose of estimating the routes used was to quantify the trucking mileage between the Western Virginia Intermodal Facility and the next nearest intermodal destinations. The routes considered the movement of goods between the Western Virginia region and each of the following locations: Charlotte, NC; Harrisburg, PA; Prichard, WV; Knoxville, TN; Norfolk, VA; and Greensboro, NC. Volumes were allocated to different routes based on the stakeholder input that formed the basis of the Base Case. The routes represented the major highways in the region, including Interstates 81, 77, 64, and 73, as well as US Routes 460 and 58. Using assumptions on the logical trucking routes between the Western Virginia region and the intermodal locations, volumes were attributed to each route. Assumptions of the routes, highways used, and annual growth rates are shown in **Exhibit 35**.

Exhibit 35: Routing Assumptions

Origin	Destination	Route	Highways used	CAGR	Rail Corridor
Western Virginia	Charlotte	1	81, 77	2.01%	Crescent
Western Virginia	Harrisburg	2	81	2.01%	Crescent
Western Virginia	Prichard	3	81, 77, 64	2.01%	Heartland
Western Virginia	Knoxville	4	81	2.01%	Crescent
Western Virginia	Norfolk	5	58, 460, 64	2.01%	Heartland
Western Virginia	Greensboro	6	73	2.01%	Crescent

Source: AECOM

A number of the facility benefits quantified in later sections, including emissions savings, safety incidents avoided, pavement savings, congestion savings, and shipper savings, are based on these route assumptions. These benefits all depend on the vehicle miles traveled (VMT) that are avoided when trucks no longer have to make trips from the Western Virginia region to the next nearest intermodal facility. The assumption of these benefits is that the trucks drive goods to the nearest facility, where the goods are transferred to rail for movement to the final destination. The truck trips are conservatively

assumed to be saved in one direction, because trucks could find a load in the return direction. Any empty returns, however, would result in additional VMT avoided that is not accounted for in this analysis. Additionally, the benefits only consider the trips that are taking place to these other intermodal facility destinations, thereby not taking benefits for trucks that may actual drive to final destinations that are farther than the next nearest intermodal facility. The mileage assumed for one way truck trips saved is listed in **Exhibit 36** below.

Exhibit 36: VMT Avoided by Truck Trips, Per Container

Origin	Destination	Miles (one way)	Rail Corridor
Roanoke	Charlotte	200	Crescent
Roanoke	Harrisburg	300	Crescent
Roanoke	Prichard	250	Heartland
Roanoke	Knoxville	260	Crescent
Roanoke	Norfolk	240	Heartland
Roanoke	Greensboro	100	Crescent

Source: Google Maps

Scenario 1: Most Optimistic
In the best case scenario, the 2019 Base Case volume is expected to represent 20% of the market captured by the facility. In addition, this scenario assumes that the facility functions as an interchange for traffic on both the Heartland and Crescent Corridors[37]. The Crescent Corridor volumes were estimated in the same manner as those using the Heartland: from stakeholder input. This results in 4,956 TEUs in the Base Case in 2014, and escalated at 2% per year to 2019 results in 5,476 TEUs. In total for Scenario 1, the Base Case estimates 14,929 TEUs in 2019, resulting in a utilization of approximately 50%. Pivoting off of the Market Scenario assumption that the Base Case represents 20% of the market captured by the facility, Scenario 1 results in a utilization of over twice what the facility can handle. As a result, the volumes are capped at 30,000 TEUs. The volumes for Scenario 1 begin at 30,000 TEUs (or 15,000 40-foot containers) and remain there for the entire analysis period, because the facility is assumed to be able to handle 15,000 lifts. The VMT avoided remains at approximately 3.5 million per year throughout the analysis period.

Scenario 2: Optimistic
Scenario 2 assumes that the Base Case volumes in 2019 represent 40% of the facility's market capture. Only Heartland Corridor traffic is considered. In addition, the scenario assumes that the facility is able to capture 5,000 TEUs from nearby intermodal facilities like Greensboro and/or Prichard. As a result, the facility handles 28,630 TEUs in 2019, representing 95% utilization. The growth rate of volumes in Scenario 2 is half that of Scenario 1, resulting in a compound annual growth rate (CAGR) of approximately 1% per year. Because the facility is assumed to handle 15,000 lifts per year, the facility reaches capacity in 2024, and the volume is held constant throughout the remainder of the analysis period. The VMT avoided ranges from 3.5 million in 2019 to 3.7 million in 2048.

Scenario 3: Pessimistic
Scenario 3 assumes that the Base Case volumes in 2019 represent 60% of the facility's market capture. Only Heartland Corridor traffic is considered. In addition, the scenario assumes that the facility is able to capture 5,000 TEUs from nearby intermodal facilities like Greensboro and/or Prichard. As a result, the facility handles 20,753 TEUs in 2019, representing 69% utilization. The growth rate of volumes in Scenario 3 is half that of Scenario 1 (and equal to the rate in Scenario 2), resulting in a CAGR of approximately 1% per year. The facility reaches 92% capacity by the end of the analysis period. The VMT avoided ranges from 2.5 million in 2019 to 3.4 million in 2048.

[37] Norfolk Southern has indicated that they have no intention of operating the facility as an interchange between the two Corridors, but this analysis attempts to quantify the volumes they could capture if it were operated in that way.

Scenario 4: Most Pessimistic
Scenario 4 assumes that the Base Case volumes in 2019 represent 80% of the facility's market capture. Only Heartland Corridor traffic is considered. As a result, the facility handles 11,815 TEUs in 2019, representing 39% utilization. The growth rate of volumes in Scenario 4 is half that of Scenarios 2 and 3, resulting in a CAGR of approximately 0.50% per year. The facility reaches 46% capacity by the end of the analysis period. The VMT avoided ranges from 1.4 million in 2019 to 1.7 million in 2048.

Results and Implications

Benefits

Shipper Savings
Shipping containers by intermodal rail service can offer a cost savings to shippers, because rail can move a greater volume of goods per train and is more fuel efficient than shipping by truck, particularly for large loads or shipments traveling longer distances. The Western Virginia Intermodal Facility would provide shippers in the Western Virginia region with better access to intermodal rail service on the Heartland Corridor and potentially the Crescent Corridor, which would provide an opportunity for shippers along these routes to reduce their transportation costs. It is estimated that railroads charge between 10% and 30% less for containerized rail services than trucks in the same shipping lanes.[38]

As part of the workshops and interviews conducted for this study, sample truck rates for Western Virginia's major shipping lanes were collected. These rates are summarized in **Exhibit 37** below.

Exhibit 37: Sample Truck Rates for Major Roanoke Shipping Lanes (2014 $M)

Origin County	Destination County	Miles	Cost	$/mile
Norfolk	Roanoke	240	$ 870	$ 3.63
Giles	Norfolk	323	$ 500	$ 1.55
Giles	Charleston, SC	378	$ 600	$ 1.59
Alleghany	Harrisburg, PA	283	$ 830	$ 2.93
Rockbridge	Harrisburg, PA	227	$ 650	$ 2.86
Wythe	Indianapolis, IN	440	$ 750	$ 1.70
Indianapolis, IN	Wythe	440	$ 1,000	$ 2.27
Average for Sample Shipping Lanes				**$ 2.36**

Source: Study Workshop and Interview Participants

Based on these sample truck costs, it is estimated that those shippers who divert their shipments from truck to intermodal rail via the new Western Virginia Intermodal Facility would be able to save 20% per mile, or $0.47 per truck VMT diverted. Applying this shipping cost savings to the conservative estimate of annual truck VMT avoided for each market scenario, yields the annual shipping savings provided to businesses in the Western Virginia region, which are summarized in **Exhibit 38**. These VMT avoided estimates are conservative because it assumes that the truck trips are to the other intermodal facilities in the shipping lanes or the Port of Virginia, which have an average trip length of 225 miles,[39] when in reality many of the trucks trips are likely to originate/terminate at locations of greater than 225 miles in order to take advantage of the full cost savings associated with diverting from truck to rail.

[38] Schoonmaker, Keith, "UP produced record revenue and operating income in 2013, and we expect the trend to continue," July 1, 2014, http://analysisreport.morningstar.com/stock/research?t=UNP&region=USA&culture=en-US&productcode=MLE
[39] See Market Scenarios Analysis section for how VMT avoided are calculated.

Exhibit 38: Total Discounted Shipper Cost Savings by Market Scenario (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 15.57	$ 17.94	$ 20.80	$ 24.32	$ 28.65
Scenario 2: Optimistic	$ 16.25	$ 18.73	$ 21.74	$ 25.43	$ 29.98
Scenario 3: Pessimistic	$ 12.55	$ 14.54	$ 16.98	$ 19.98	$ 23.70
Scenario 4: Most Pessimistic	$ 6.79	$ 7.84	$ 9.12	$ 10.70	$ 12.65

Source: AECOM Analysis

Safety

The Western Virginia Intermodal Facility would provide shippers in the Western Virginia region with better access to intermodal rail service on the Heartland Corridor and potentially the Crescent Corridor, which would provide an opportunity for shippers along these routes to divert current or future truck shipments to rail—thereby reducing truck VMT. This avoided truck VMT reduces the likelihood of crashes and associated deaths, injuries, and property damage on regional roadways. The crash rates shown in **Exhibit 39** were applied to the truck VMT avoided to determine the number of fatalities, injuries, and crashes avoided.

Exhibit 39: Accidents Rates per 100,000,000 VMT, 2011

Accident Type	Rate
Fatalities	1.0986
Injured persons	75.2499
Crashes	181.1772

Source: 2011 BTS Motor Vehicle Safety Data, Table 2-17

These estimated accidents avoided by type were then converted to the Maximum Abbreviated Injury Score (MAIS) accident scale in order to apply US DOT Guidance on the value of avoiding an accident. The conversion is based on the National Highway Traffic Safety Administration KABCO-AIS Conversion Table (July 2011)[40] for Injury (severity unknown) and No Injury accidents.

Applying accident rates to the truck VMT avoided and converting to MAIS accident type results in estimates of annual fatalities and MAIS injuries avoided. The fatalities and injuries avoided in 2019 by scenario are shown in **Exhibit 40**.

[40] USDOT, TIGER 2014 Benefit-Cost Analysis Resource Guide, April 18, 2014, http://www.dot.gov/sites/dot.gov/files/docs/TIGER%20BCA%20Resource%20Guide%202014.pdf

Exhibit 40: Total Fatalities, Injuries, and Property Damage Avoided by Scenario, 2019

Accident Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Fatalities	0.04	0.04	0.03	0.02
MAIS 5	0.03	0.03	0.02	0.01
MAIS 4	0.01	0.01	0.01	0.00
MAIS 3	0.10	0.10	0.07	0.04
MAIS 2	0.29	0.29	0.21	0.12
MAIS 1	2.10	2.11	1.53	0.87
PDO	6.40	6.44	4.67	2.65

Source: AECOM

The total annual value for accident severity is based on US DOT Guidance[41] estimates for the economic value of avoiding an accident. The economic values applied in this analysis are summarized in **Exhibit 41** below.

Exhibit 41: Value of Accidents Avoided, 2013 (2014 $M)

Value of Accidents Avoided	2013 $M	2014 $M
Value of Statistical Life, 2013	$ 9.200	$ 9.338
MAIS 5 Critical (0.593) Fraction of VSL	$ 5.456	$ 5.537
MAIS 4 Severe (0.266) Fraction of VSL	$ 2.447	$ 2.484
MAIS 3 Serious (0.105) Fraction of VSL	$ 0.966	$ 0.980
MAIS 2 Moderate (0.047) Fraction of VSL	$ 0.432	$ 0.439
MAIS 1 Minor (0.003) Fraction of VSL	$ 0.028	$ 0.028
No Injury, 2010	$ 0.004	$ 0.004

Note: $2013 were escalated to $2014 using GDP Price Deflator
Source: USDOT, Guidance on Treatment of the Economic Value of a Statistical Life, 2014

Applying the value of accidents avoided in **Exhibit 41** to the projections of crash reductions by injury type yields the annual safety benefits associated with the diversion of truck VMT to intermodal rail via the Western Virginia Intermodal Facility. **Exhibit 42** summarizes the discounted safety benefits associated with each market scenario. Similar to the shipper savings, the VMT avoided estimates that these benefits are based on is conservative, because it assumes that the truck trips are to the other intermodal facilities in the shipping lanes or the Port of Virginia, which have an average trip length of 225 miles[42], when in reality many of the trucks trips are likely to originate/terminate at locations of greater than 225 miles.

[41] USDOT, Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in USDOT Analyses, 2014, http://www.dot.gov/sites/dot.gov/files/docs/VSL_Guidance_2014.pdf
[42] See Market Scenarios Analysis section for how VMT avoided are calculated.

Exhibit 42: Total Discounted Safety Benefits by Market Scenario, 2019-2048 (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 8.01	$ 9.23	$ 10.70	$ 12.51	$ 14.74
Scenario 2: Optimistic	$ 8.36	$ 9.64	$ 11.18	$ 13.08	$ 15.42
Scenario 3: Pessimistic	$ 6.46	$ 7.48	$ 8.73	$ 10.28	$ 12.19
Scenario 4: Most Pessimistic	$ 3.49	$ 4.03	$ 4.69	$ 5.50	$ 6.51

Source: AECOM Analysis

Emission Savings

The Western Virginia Intermodal Facility would provide an opportunity for shippers in the Western Virginia region to divert current or future truck shipments to rail—thereby reducing truck VMT and emissions. Truck emission rate outputs for long-haul truck travel, based on the Federal Motor Carrier Safety Administration's (FMCSA) *Hours of Service (HOS) Environmental Assessment*[43] for carbon monoxide (CO), nitrogen oxide (NOx), volatile organic compounds (VOCs), particulate matter (PM), sulfur dioxide (SO2) and carbon dioxide (CO2), are applied to the annual truck VMT avoided to estimate the pollutant emissions avoided. **Exhibit 43** depicts the FMCSA truck emission rates applied.

Exhibit 43: Long-Haul Truck Travel Emissions Factors (g/VMT)

Year	CO	NOX	PM2.5	PM10	SO2	VOC	CO2
2015	0.57	2.37	0.1	0.1	0.0055	0.1	751.78
2020	0.31	1.31	0.05	0.05	0.0053	0.06	750.92

Source: FMSCA, Hours of Service (HOS) Environmental Assessment, Appendix A: Analysis of Air Quality Impacts, 2011

The emission rates in grams per mile are multiplied by the appropriate conversion factor to calculate short tons per mile for each pollutant type, except CO2 which is in metric tons per mile. The tons of emissions avoided per VMT, shown in **Exhibit 44** for 2019 by scenario, are then multiplied by the annual truck VMT avoided. The resulting tons were multiplied by the economic value of the emissions damage cost from National Highway Safety Administration (NHTSA) guidance[44] as shown in **Exhibit 45**.

[43] FMCSA, Hours of Service (HOS) Environmental Assessment, Appendix A: Analysis of Air Quality Impacts, 2011, http://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/2011_HOS_Final_Rule_EA_Appendices.pdf

[44] NHTSA, Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light Trucks (August 2012), http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FRIA_2017-2025.pdf

Exhibit 44: Tons of Emissions Avoided by Scenario, 2019

Emission Avoided	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Carbon Monoxide	2.19	2.20	1.59	0.91
Nitrogen Oxides	9.10	9.14	6.63	3.77
Particulate Matter 2.5	0.38	0.39	0.28	0.16
Particulate Matter 10	0.38	0.39	0.28	0.16
Sulfur Dioxide	0.02	0.02	0.02	0.01
Volatile Organic Compounds	0.38	0.39	0.28	0.16
Carbon Dioxide	2,618	2,631	1,908	1,085

Source: AECOM

Exhibit 45: Value of Emissions (2014$)

Value of Emissions	2013$	2014$	Unit
Carbon Monoxide	$0	$0	$/short ton
Volatile Organic Compounds	$1,813	$1,840	$/short ton
Nitrogen Oxides	$7,147	$7,254	$/short ton
Particulate Matter	$326,935	$331,829	$/short ton
Sulfur Dioxide	$42,240	$42,872	$/short ton
Carbon Dioxide[45]	*varies (SCC)*	*varies (SCC)*	$/metric ton

Note: $2013 were escalated to $2014 using GDP Price Deflator
Source: NHTSA, Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light Trucks, August 2012

Exhibit 46 summarizes the discounted emission savings associated with each market scenario, and **Exhibit 47** shows the discounted CO2 benefits. Similar to the shipper savings, the VMT avoided estimates that the emission savings are based on is conservative, because it assumes that the truck trips are to the other intermodal facilities in the shipping lanes or the Port of Virginia, which have an average trip length of 225 miles,[46] when in reality many of the trucks trips are likely to originate/terminate at locations of greater than 225 miles.

[45] Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013; revised November 2013), page 18, Table A1 "Annual SCC Values: 2010-2050 (2007$/metric ton CO2)" as reported in the USDOT TIGER 2014 BCA Resource Guide
[46] See Market Scenarios Analysis section for how VMT avoided are calculated.

Exhibit 46: Total Discounted Emission Savings by Market Scenario, 2019-2048 (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 1.68	$ 1.92	$ 2.21	$ 2.57	$ 3.01
Scenario 2: Optimistic	$ 1.74	$ 2.00	$ 2.31	$ 2.68	$ 3.15
Scenario 3: Pessimistic	$ 1.34	$ 1.55	$ 1.79	$ 2.10	$ 2.48
Scenario 4: Most Pessimistic	$ 0.73	$ 0.84	$ 0.97	$ 1.13	$ 1.33

Source: AECOM Analysis

Exhibit 47: Total Discounted CO2 Benefits by Market Scenario, 2019-2048 (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 2.71	$ 2.71	$ 2.71	$ 2.71	$ 2.71
Scenario 2: Optimistic	$ 2.84	$ 2.84	$ 2.84	$ 2.84	$ 2.84
Scenario 3: Pessimistic	$ 2.27	$ 2.27	$ 2.27	$ 2.27	$ 2.27
Scenario 4: Most Pessimistic	$ 1.20	$ 1.20	$ 1.20	$ 1.20	$ 1.20

Note: CO2 is only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis, so the benefit is the same across all discount rates.
Source: AECOM Analysis

Congestion Savings

The Western Virginia Intermodal Facility would provide an opportunity for shippers in the Western Virginia region to divert current or future truck shipments to rail—thereby reducing truck VMT and highway congestion. This reduction in truck VMT benefits the remaining users on the regional roadways and reduces the marginal cost of congestion on these other vehicles. The marginal cost of congestion for trucks varies based on whether the Interstate routes used are urban or rural. Based on the diverted truck routes used to estimate the VMT avoided, the percentage of these interstate routes that are urban or rural was estimated using Google Maps. **Exhibit 48** summarizes the share of the diverted truck routes that are urban and rural.

Exhibit 48: Rural and Urban Shares of Diverted Truck Interstate Routes

Origin	Destination	Urban	Rural
Roanoke	Charlotte	20%	80%
Roanoke	Harrisburg	25%	75%
Roanoke	Prichard	10%	90%
Roanoke	Knoxville	10%	90%
Roanoke	Norfolk	20%	80%
Roanoke	Greensboro	10%	90%

Source: AECOM, based on Google Maps

The Federal Highway Administration (FHWA) Cost Allocation Study, 2000 Addendum estimates the marginal congestion costs per VMT to be $0.326 cents ($2000) or $0.432 cents ($2014) for a 60kip 4-axle U.S. truck on urban Interstates and $0.033 cents ($2000) or $0.043 cents ($2014) for rural Interstates.[47] Applying these marginal congestion costs to the annual reduction in urban and rural truck VMT by route, yields the congestion cost savings. **Exhibit 49** summarizes the discounted congestion cost savings associated with each market scenario. Similar to the shipper savings, the VMT avoided estimate that the congestion cost savings are based on is conservative, because it assumes that the truck trips are to the other intermodal facilities in the shipping lanes or the Port of Virginia, which have an average trip length of 225 miles,[48] when in reality many of the trucks trips are likely to originate/terminate at locations of greater than 225 miles.

Exhibit 49: Total Discounted Congestion Cost Savings by Market Scenario, 2019-2048 (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 3.48	$ 4.01	$ 4.65	$ 5.43	$ 6.40
Scenario 2: Optimistic	$ 3.55	$ 4.09	$ 4.74	$ 5.55	$ 6.54
Scenario 3: Pessimistic	$ 2.73	$ 3.17	$ 3.70	$ 4.35	$ 5.16
Scenario 4: Most Pessimistic	$ 1.49	$ 1.72	$ 2.00	$ 2.34	$ 2.77

Source: AECOM Analysis

Pavement Savings

The reduction in truck VMT associated with the diversion of truck shipments to rail with the Western Virginia Intermodal Facility reduces the wear and tear on the pavement for regional roadways, and as such, reduces the marginal cost of maintaining the pavement. The marginal cost of pavement for truck travel depends on whether the Interstate routes that would have been used are urban or rural. The assumptions on the share of each Interstate route that are urban or rural are the same as those used for the congestion cost savings and are shown in **Exhibit 48**.

The FHWA Cost Allocation Study, 2000 Addendum estimates the marginal pavement costs per VMT to be $0.181 cents ($2000) or $0.215 cents ($2014) for a 60kip 4-axle U.S. truck on urban Interstates and $0.056 cents ($2000) or $0.067 cents ($2014) for rural Interstates.[49] Applying these marginal pavement costs to the annual reduction in urban and rural truck VMT by route, yields the pavement savings.

Exhibit 50 summarizes the discounted pavement savings associated with each market scenario. Similar to the shipper savings, the VMT avoided estimate that the pavement savings are based on is conservative, because it assumes that the truck trips are to the other intermodal facilities in the shipping lanes or the Port of Virginia, which have an average trip length of 225 miles,[50] when in reality many of the trucks trips are likely to originate/terminate at locations of greater than 225 miles.

[47] $2000 were escalated to $2014 using GDP Deflators.

[48] See Market Scenarios Analysis section for how VMT avoided are calculated.

[49] $2000 were escalated to $2014 using GDP Deflators.

[50] See Market Scenarios Analysis section for how VMT avoided are calculated.

Exhibit 50: Total Discounted Pavement Savings by Market Scenario, 2019-2048 (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 2.98	$ 3.43	$ 3.98	$ 4.65	$ 5.48
Scenario 2: Optimistic	$ 3.08	$ 3.54	$ 4.11	$ 4.81	$ 5.67
Scenario 3: Pessimistic	$ 2.37	$ 2.75	$ 3.21	$ 3.78	$ 4.48
Scenario 4: Most Pessimistic	$ 1.29	$ 1.49	$ 1.73	$ 2.03	$ 2.40

Source: AECOM Analysis

Residual

Construction of the new track and highway road/bridge improvements, as well as the land purchases required for the project, will have residual value after the end of the 30-year analysis period, because the useful life of these elements is longer than 30 years. The useful life of the highway/bridge improvements is 54 years.[51] Therefore, the value of the highway/bridge improvements is depreciated straight-line over 54 years. The first 30 years of depreciation are excluded from the residual estimation, as they are the basis of the benefits estimated elsewhere in the analysis; while, the remaining 24 years are discounted at 7%, 6%, 5%, 4%, and 3%. In addition, the tracks have a useful life longer than the analysis period. Track has a useful life of 38 years[52], and as a result the remaining track value is depreciated straight-line for eight years after the analysis period and discounted at 7%, 6%, 5%, 4%, and 3%. Finally, right of way does not depreciate, so the value of the property acquired for the facility is also included in the residual analysis, but not depreciated.

The remaining discounted value of the bridges and track are summed with the discounted value of the right of way acquired. The value of the remaining useful life for the each market scenario is shown in **Exhibit 51**. It is important to note that the capital costs for each market scenario are the same.

Exhibit 51: Total Discounted Residual Value, 2019-2048 (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenarios 1-4	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33

Source: AECOM

Costs/Cost Offsets

Capital

The capital costs for the Western Virginia Intermodal Facility are based on the AECOM estimate and include the costs for preparing the site, paving approximately 55 of the 65 acres, track work, and the relocation of Cove Hollow Road and a bridge. The capital costs are applied over the 30-month construction period estimated by NS, beginning in July 2016 and ending in December 2018. The total cost of the project is $77.53 million in all four scenarios, broken out by expense type in **Exhibit 52**.

[51] The useful life of other railroad structures is 54 years according to the Bureau of Economic Analysis (BEA), Rate of Depreciation, Service Lives, Declining-Balance Rates, and Hulten-Wykoff Categories

[52] The useful life of railroad replacement track is 38 years according to the Bureau of Economic Analysis (BEA), Rate of Depreciation, Service Lives, Declining-Balance Rates, and Hulten-Wykoff Categories

Exhibit 52: Capital Costs Used in All Scenarios

	2014 $M
Preconstruction	$ 0.27
General Requirements	$ 6.82
Site Construction	$ 37.65
Concrete Structure	$ -
Trackwork	$ 5.99
Buildings & Canopy	$ 0.91
Mechanical	$ 0.59
Electric, Communication, CCTV	$ 1.50
Contingency/Engineering FD	$ 8.84
Other Costs	$ 14.96
Total	**$ 77.53**

Source: AECOM

The discounted capital costs of the project for all scenarios at the five discount rates are displayed in **Exhibit 53** below.

Exhibit 53: Discounted Capital Costs of the Facility (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenarios 1-4	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75

Source: AECOM Analysis

In an analysis of the financial viability of the project, the $25 million state subsidy available to the facility was deducted from the capital cost of constructing the facility. The total capital costs of the project considering the subsidy are displayed in **Exhibit 54** below.

Exhibit 54: Discounted Capital Cost of Facility Considering $25M Subsidy (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenarios 1-4	$ 42.74	$ 43.98	$ 45.27	$ 46.61	$ 48.00

Source: AECOM Analysis

Operating & Maintenance

The project requires annual and periodic O&M costs to keep the tracks, bridge, road, and pad up to code and operating efficiently. The O&M costs are based on a range of typical O&M costs provided by NS. On the high end, because the facility will be operating at capacity over the analysis period, the O&M for Scenarios 1 and 2 are assumed to be $750,000 per year. Because Scenarios 3 and 4 operate below capacity, the O&M costs are assumed to be $500,000 per year. The discounted O&M costs of the four scenarios are shown in **Exhibit 55**.

Exhibit 55: Discounted O&M Costs by Scenario (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenarios 1 & 2	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Scenarios 3 & 4	$ 4.73	$ 5.45	$ 6.32	$ 7.39	$ 8.71

Source: AECOM Analysis

Lift Fee Revenues (Cost Offset)

The operator of the facility will charge users a fee to use the facility. This lift fee is charged based on the movement of each container. As a result, the revenue earned by the lift fees is an offset to the capital and operating costs. The charge per container is estimated to be about $90 based on AECOM analysis of similar movements at other facilities. Some shippers may be able to negotiate a lower rate, particularly if they have high volumes, and some may have a higher rate, so the $90 is an average per container fee. Applying the $90 per lift for the volumes of containers moved in each of the scenarios results in the discounted revenues shown in **Exhibit 56**.

Exhibit 56: Discounted Lift Fee Revenues by Scenario (2014 $M)

Market Scenario	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Scenario 1: Most Optimistic	$ 12.78	$ 14.72	$ 17.07	$ 19.95	$ 23.51
Scenario 2: Optimistic	$ 12.66	$ 14.60	$ 16.94	$ 19.82	$ 23.36
Scenario 3: Pessimistic	$ 9.78	$ 11.33	$ 13.23	$ 15.56	$ 18.47
Scenario 4: Most Pessimistic	$ 5.29	$ 6.11	$ 7.11	$ 8.34	$ 9.86

Source: AECOM Analysis

Summary

From the perspective of the facility owner, a revenue to cost (R/C) ratio compares the revenues generated by the lift fees to the individual cost components. The R/C ratios show that the facility more than covers the operating costs over the analysis period at all discount rates and for all scenarios. Scenarios 1 and 2 have annual operating costs of $750,000, while Scenarios 3 and 4 are $500,000 annually. As a result of the R/C ratios for all four scenarios being above 1.0, the facility can operate and generate sufficient revenue that in turn can be used to pay back the capital costs of the facility's construction. These results show that the operation of a facility could possibly be contracted out or negotiated through a public private partnership (P3).

Exhibit 57: R/C Ratio of Lift Fee Revenues to Operating Costs for Scenario 1

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
O&M Cost	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Lift Fee Revenues	$ 12.78	$ 14.72	$ 17.07	$ 19.95	$ 23.51
R/C Ratio	**1.80**	**1.80**	**1.80**	**1.80**	**1.80**

Source: AECOM

Exhibit 58: R/C Ratio of Lift Fee Revenues to Operating Costs for Scenario 2

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
O&M Cost	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Lift Fee Revenues	$ 12.66	$ 14.60	$ 16.94	$ 19.82	$ 23.36
R/C Ratio	**1.78**	**1.78**	**1.79**	**1.79**	**1.79**

Source: AECOM

Exhibit 59: R/C Ratio of Lift Fee Revenues to Operating Costs for Scenario 3

	Scenario 3: Identified Shippers Represent 60% of Market, Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
O&M Cost	$ 4.73	$ 5.45	$ 6.32	$ 7.39	$ 8.71
Lift Fee Revenues	$ 9.78	$ 11.33	$ 13.23	$ 15.56	$ 18.47
R/C Ratio	**2.07**	**2.08**	**2.09**	**2.11**	**2.12**

Source: AECOM

Exhibit 60: R/C Ratio of Lift Fee Revenues to Operating Costs for Scenario 4

	Scenario 4: Identified Shippers Represent 80% of Market, Most Pessimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
O&M Cost	$ 4.73	$ 5.45	$ 6.32	$ 7.39	$ 8.71
Lift Fee Revenues	$ 5.29	$ 6.11	$ 7.11	$ 8.34	$ 9.86
R/C Ratio	**1.12**	**1.12**	**1.12**	**1.13**	**1.13**

Source: AECOM

Exhibit 61, **Exhibit 62**, **Exhibit 63** and **Exhibit 64** below summarize the discounted value of the costs and benefits discussed in this report from a total economic perspective. Using discount rates from 3% to 7%, the benefits—residual savings, pavement savings, congestion savings, shipper savings, emissions reductions, carbon avoided, and safety incidents avoided provide for a range of $16-$69 million dollars of benefits over the analysis period. Compared to similarly discounted cost estimates, the benefit cost ratios for the project range from 0.26 to 1.14.

Exhibit 61: Scenario 1 Benefit Cost Analysis

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Less Lift Fee Revenues	*$ 12.78*	*$ 14.72*	*$ 17.07*	*$ 19.95*	*$ 23.51*
Total Costs	***$ 57.22***	***$ 58.21***	***$ 59.08***	***$ 59.80***	***$ 60.30***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 2.98	$ 3.43	$ 3.98	$ 4.65	$ 5.48
Congestion Savings	$ 3.48	$ 4.01	$ 4.65	$ 5.43	$ 6.40
Shipper Savings	$ 15.57	$ 17.94	$ 20.80	$ 24.32	$ 28.65
Emissions	$ 1.68	$ 1.92	$ 2.21	$ 2.57	$ 3.01
CO2	$ 2.71	$ 2.71	$ 2.71	$ 2.71	$ 2.71
Safety	$ 8.01	$ 9.23	$ 10.70	$ 12.51	$ 14.74
Total Benefits	***$ 35.88***	***$ 41.23***	***$ 47.82***	***$ 56.02***	***$ 66.31***
BC Ratio	**0.63**	**0.71**	**0.81**	**0.94**	**1.10**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010

Source: AECOM

Exhibit 62: Scenario 2 Benefit Cost Analysis

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Less Lift Fee Revenues	*$ 12.66*	*$ 14.60*	*$ 16.94*	*$ 19.82*	*$ 23.36*
Total Costs	***$ 57.34***	***$ 58.33***	***$ 59.21***	***$ 59.94***	***$ 60.45***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 3.08	$ 3.54	$ 4.11	$ 4.81	$ 5.67
Congestion Savings	$ 3.55	$ 4.09	$ 4.74	$ 5.55	$ 6.54
Shipper Savings	$ 16.25	$ 18.73	$ 21.74	$ 25.43	$ 29.98
Emissions	$ 1.74	$ 2.00	$ 2.31	$ 2.68	$ 3.15
CO2	$ 2.84	$ 2.84	$ 2.84	$ 2.84	$ 2.84
Safety	$ 8.36	$ 9.64	$ 11.18	$ 13.08	$ 15.42
Total Benefits	***$ 37.27***	***$ 42.84***	***$ 49.70***	***$ 58.23***	***$ 68.93***
BC Ratio	**0.65**	**0.73**	**0.84**	**0.97**	**1.14**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010
Source: AECOM

Exhibit 63: Scenario 3 Benefit Cost Analysis

	Scenario 3: Identified Shippers Represent 60% of Market, Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 4.73	$ 5.45	$ 6.32	$ 7.39	$ 8.71
Less Lift Fee Revenues	*$ 9.78*	*$ 11.33*	*$ 13.23*	*$ 15.56*	*$ 18.47*
Total Costs	***$ 57.86***	***$ 58.87***	***$ 59.77***	***$ 60.50***	***$ 60.99***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 2.37	$ 2.75	$ 3.21	$ 3.78	$ 4.48
Congestion Savings	$ 2.73	$ 3.17	$ 3.70	$ 4.35	$ 5.16
Shipper Savings	$ 12.55	$ 14.54	$ 16.98	$ 19.98	$ 23.70
Emissions	$ 1.34	$ 1.55	$ 1.79	$ 2.10	$ 2.48
CO2	$ 2.27	$ 2.27	$ 2.27	$ 2.27	$ 2.27
Safety	$ 6.46	$ 7.48	$ 8.73	$ 10.28	$ 12.19
Total Benefits	***$ 29.18***	***$ 33.77***	***$ 39.46***	***$ 46.59***	***$ 55.62***
BC Ratio	**0.50**	**0.57**	**0.66**	**0.77**	**0.91**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010
Source: AECOM

Exhibit 64: Scenario 4 Benefit Cost Analysis

	Scenario 4: Identified Shippers Represent 80% of Market, Most Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 4.73	$ 5.45	$ 6.32	$ 7.39	$ 8.71
Less Lift Fee Revenues	*$ 5.29*	*$ 6.11*	*$ 7.11*	*$ 8.34*	*$ 9.86*
Total Costs	***$ 62.35***	***$ 64.09***	***$ 65.88***	***$ 67.72***	***$ 69.60***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 1.29	$ 1.49	$ 1.73	$ 2.03	$ 2.40
Congestion Savings	$ 1.49	$ 1.72	$ 2.00	$ 2.34	$ 2.77
Shipper Savings	$ 6.79	$ 7.84	$ 9.12	$ 10.70	$ 12.65
Emissions	$ 0.73	$ 0.84	$ 0.97	$ 1.13	$ 1.33
CO2	$ 1.20	$ 1.20	$ 1.20	$ 1.20	$ 1.20
Safety	$ 3.49	$ 4.03	$ 4.69	$ 5.50	$ 6.51
Total Benefits	***$ 16.44***	***$ 19.12***	***$ 22.48***	***$ 26.74***	***$ 32.18***
BC Ratio	**0.26**	**0.30**	**0.34**	**0.39**	**0.46**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010
Source: AECOM

State Perspective (BCR)
From the perspective of the Commonwealth, the BCRs are equal to the public as displayed in **Exhibit 61**, **Exhibit 62**, **Exhibit 63**, and **Exhibit 64**, above.

Owner/Operator Perspective (R/C Ratio)
Comparing only the capital costs to the lift fee revenues yields R/C ratios that show no scenario results in a ratio above 0.49 under any interest rate, even considering the $25 million state subsidy. These tables indicate that the revenues earned by the operator are not enough to cover the capital costs of the facility. However, capital costs can be financed through a variety of other funding sources, including US DOT Transportation Investment Generating Economic Recovery (TIGER) grants, Business Improvement Districts/Tax Increment Financing (TIF), or capital subsidies. In addition, the revenues are more than enough to cover the operating expenses of the facility (as seen in **Exhibit 61**, **Exhibit 62**, **Exhibit 63**, and **Exhibit 64**), so some of the extra revenue could go towards paying down the loans on the facility construction costs.

Exhibit 65: R/C Ratio of Lift Fee Revenues to Capital Cost for Scenario 1

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Capital Cost	$ 42.74	$ 43.98	$ 45.27	$ 46.61	$ 48.00
Lift Fee Revenues	$ 12.78	$ 14.72	$ 17.07	$ 19.95	$ 23.51
R/C Ratio	**0.30**	**0.33**	**0.38**	**0.43**	**0.49**

Source: AECOM

Exhibit 66: R/C Ratio of Lift Fee Revenues to Capital Cost for Scenario 2

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Capital Cost	$ 42.74	$ 43.98	$ 45.27	$ 46.61	$ 48.00
Lift Fee Revenues	$ 12.66	$ 14.60	$ 16.94	$ 19.82	$ 23.36
R/C Ratio	**0.30**	**0.33**	**0.37**	**0.43**	**0.49**

Source: AECOM

Exhibit 67: R/C Ratio of Lift Fee Revenues to Capital Cost for Scenario 3

	Scenario 3: Identified Shippers Represent 60% of Market, Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Capital Cost	$ 42.74	$ 43.98	$ 45.27	$ 46.61	$ 48.00
Lift Fee Revenues	$ 9.78	$ 11.33	$ 13.23	$ 15.56	$ 18.47
R/C Ratio	**0.23**	**0.26**	**0.29**	**0.33**	**0.38**

Source: AECOM

Exhibit 68: R/C Ratio of Lift Fee Revenues to Capital Cost for Scenario 4

	Scenario 4: Identified Shippers Represent 80% of Market, Most Pessimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Capital Cost	$ 42.74	$ 43.98	$ 45.27	$ 46.61	$ 48.00
Lift Fee Revenues	$ 5.29	$ 6.11	$ 7.11	$ 8.34	$ 9.86
R/C Ratio	**0.12**	**0.14**	**0.16**	**0.18**	**0.21**

Source: AECOM

From the perspective of the facility owner, the calculation of the benefits compared to costs considers the capital cost reduction of the $25 million state subsidy, and the only benefits are the residual value and the lift revenues. The operating costs remain the same as in the State Perspective calculation. Because the benefits considered are only those that impact the owner/operator of the facility, the calculation is a ratio of the revenues to the costs, thus an R/C ratio. The tables below consider the $25 million state subsidy, but no operating subsidies.

A capital subsidy totaling $69.2M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 1 volumes.

Exhibit 69: R/C Ratio including Residual for Scenario 1

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 49.84	$ 52.16	$ 54.76	$ 57.69	$ 61.06
Total Revenues	$ 14.24	$ 16.73	$ 19.84	$ 23.79	$ 28.84
R/C Ratio	**0.29**	**0.32**	**0.36**	**0.41**	**0.47**

Source: AECOM

A capital subsidy totaling $69.3M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 2 volumes.

Exhibit 70: R/C Ratio including Residual for Scenario 2

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 49.84	$ 52.16	$ 54.76	$ 57.69	$ 61.06
Total Revenues	$ 14.12	$ 16.60	$ 19.71	$ 23.65	$ 28.69
R/C Ratio	**0.28**	**0.32**	**0.36**	**0.41**	**0.47**

Source: AECOM

A capital subsidy totaling $69.9M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 3 volumes.

Exhibit 71: R/C Ratio including Residual for Scenario 3

	Scenario 3: Identified Shippers Represent 60% of Market, Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 47.48	$ 49.43	$ 51.59	$ 54.00	$ 56.71
Total Revenues	$ 11.24	$ 13.34	$ 16.00	$ 19.40	$ 23.79
R/C Ratio	**0.24**	**0.27**	**0.31**	**0.36**	**0.42**

Source: AECOM

A capital subsidy totaling $75.5M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 4 volumes.

Exhibit 72: R/C Ratio including Residual for Scenario 4

	Scenario 4: Identified Shippers Represent 80% of Market, Most Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 47.48	$ 49.43	$ 51.59	$ 54.00	$ 56.71
Total Revenues	$ 6.75	$ 8.12	$ 9.88	$ 12.18	$ 15.19
R/C Ratio	**0.14**	**0.16**	**0.19**	**0.23**	**0.27**

Source: AECOM

When the residual value of the facility is excluded from the calculation, the facility would take even longer to recuperate its capital costs. The tables below consider the $25 million state capital subsidy, but no operating subsidies.

A capital subsidy totaling $71M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 1 volumes, excluding residual benefits.

Exhibit 73: R/C Ratio excluding Residual for Scenario 1

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 49.84	$ 52.16	$ 54.76	$ 57.69	$ 61.06
Total Revenues	$ 12.78	$ 14.72	$ 17.07	$ 19.95	$ 23.51
R/C Ratio	**0.26**	**0.28**	**0.31**	**0.35**	**0.39**

Source: AECOM

A capital subsidy totaling $71.1M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 2 volumes, excluding residual benefits.

Exhibit 74: R/C Ratio excluding Residual for Scenario 2

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 49.84	$ 52.16	$ 54.76	$ 57.69	$ 61.06
Total Revenues	$ 12.66	$ 14.60	$ 16.94	$ 19.82	$ 23.36
R/C Ratio	**0.25**	**0.28**	**0.31**	**0.34**	**0.38**

Source: AECOM

A capital subsidy totaling $71.7M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 3 volumes, excluding residual benefits.

Exhibit 75: R/C Ratio excluding Residual for Scenario 3

	Scenario 3: Identified Shippers Represent 60% of Market, Pessimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 47.48	$ 49.43	$ 51.59	$ 54.00	$ 56.71
Total Revenues	$ 9.78	$ 11.33	$ 13.23	$ 15.56	$ 18.47
R/C Ratio	**0.21**	**0.23**	**0.26**	**0.29**	**0.33**

Source: AECOM

A capital subsidy totaling $77.3M would be needed to get an R/C of 1.0 at the 7% discount rate under Scenario 4 volumes, excluding residual benefits.

Exhibit 76: R/C Ratio excluding Residual for Scenario 4

	Scenario 4: Identified Shippers Represent 80% of Market, Most Pessimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 47.48	$ 49.43	$ 51.59	$ 54.00	$ 56.71
Total Revenues	$ 5.29	$ 6.11	$ 7.11	$ 8.34	$ 9.86
R/C Ratio	**0.11**	**0.12**	**0.14**	**0.15**	**0.17**

Source: AECOM

Economic Assessment

Construction Impacts

The project will primarily draw employees and supplies from the Roanoke MSA, which is considered for the job creation analysis. The Roanoke MSA includes Botetourt, Craig, Franklin, Roanoke, and Salem counties in Virginia, in addition to the City of Roanoke. Additional employment could come from adjacent MSAs including Blacksburg-Christiansburg-Radford[53], Danville, and Lynchburg, though the construction impacts quantified here only consider the Roanoke MSA. The construction costs shown in **Exhibit 77** are for project planning and construction activities only[54] – broken out by construction and professional services.

Exhibit 77: Project Costs

	Total (2014$)
Construction Expenditure ($M)	$ 46.64
Professional Services Expenditure ($M)	$ 21.69
Total Expenditure ($M)	$ 68.33

Note: Right of Way costs are excluded from the analysis
Source: AECOM

The project's total annual construction expenditures and direct, on-project jobs created during the construction period are shown in **Exhibit 78**[55]. The construction of the project represents a large capital investment in the regional economy. This spending will increase employment and earnings in the region for the duration of the construction process. As seen in **Exhibit 78**, construction of the project is estimated to support or create over 887 jobs of one year's duration, including 361 direct construction and 130 direct professional services job years, as detailed in **Exhibit 78**. A job for one person that lasts three years would be equivalent to three person year jobs. These jobs are temporary; they last for the duration of the construction period, ramping up and down with the construction cycle[56].

[53] The Blacksburg-Christiansburg-Radford MSA encompasses Giles, Montgomery, and Pulaski Counties and the City of Radford.

[54] Right of way is excluded from the analysis because it is a financial exchange that produces nothing.

[55] The direct employment impacts were estimated using the quarterly construction expenditures and RIMS II multipliers for the Roanoke, VA MSA. Given the multiplier relationships, the final-demand employment multiplier divided by the direct-effect employment multiplier yields an estimate of the initial (or direct) employment per $1 million final demand.

[56] The economic impacts from the construction of the Project are estimated for the Roanoke, VA MSA based on the construction and professional services expenditures and the construction and professional services RIMS II multipliers for the region. The Final Demand construction RIMS II multipliers are 0.5941 (earnings) and 14.5482 (employment) for the region. The Final Demand professional services RIMS II multipliers are 0.6506 (earnings) and 12.1175 (employment). Please note that to use the final demand multipliers for employment, the costs were deflated to 2010 dollars using GDP deflators because the RIMS II multipliers are based on 2010 data.

Exhibit 78: Annual Construction Expenditures and Direct Earnings Created in the Roanoke MSA (2014 $M)

	2016	2017	2018	Total
Total Expenditures ($M)	$ 6.83	$ 47.83	$ 13.67	$ 68.33
Direct Employment: Construction (job years)	36	252	72	361
Direct Employment: Professional Services (job years)	13	91	26	130
Total Earnings: Construction ($M)	$ 2.77	$ 19.40	$ 5.54	$ 27.71
Total Earnings: Professional Services ($M)	$ 1.41	$ 9.88	$ 2.82	$ 14.11
Total Employment: Construction (job years)	64	449	128	641
Total Employment: Professional Services (job years)	25	172	49	246

Note: Sums may not equal totals due to rounding
Source: AECOM analysis using RIMS II multipliers and monthly Project costs based on $77.53 million facility

Potential Additional Development Impacts

In an effort to estimate the adjacent development that could occur as a result of the intermodal facility, the growth around NS's Greencastle intermodal facility was analyzed. Construction was completed on the Greencastle facility in 2013, and in the years prior the Franklin County Area Development Corporation (FCADC) released business expansions and announcements through their annual reports. Counties around the Western Virginia Intermodal Facility could anticipate similar announcements and adjacent development as a result of the construction. To understand a comparable scale, the announcements from the FCADC were compiled from 2010 through 2013, as shown in **Exhibit 79**.

Exhibit 79: New Businesses or Expansions near Greencastle, PA 2010-2013

Business	Size	Employees	Year Opened
Sunset Industrial Applications	60,000 square feet	50 new jobs in three years [1]	
WIPRO Infrastructure Engineering	33,000 square feet		
TORCOMP Machining & Components	16,400 square feet	70 new manufacturing jobs	Expected to be completed in Summer 2014 [1]
Procter & Gamble	1.7 million square feet	>960 jobs	Construction announced in 2013 [1]
Gate 7 LLC	12,000 square feet		2013 [1]
World Kitchen	250,000 square feet (expansion)	Retention of 500 jobs	2013 (began construction) [1]
Armada Supply Chain Solutions d.b.a. Hub One Logistics ATAPCO Properties	400,000 square feet		2013 [1]
Leidy's Custom Woodworking, Inc.	33,765 square feet		2013 (space acquired) [1]
Fil-Tec, Inc.	110,000 square feet (planned) [2]	60	TBD [1]
Ulta Beauty	350,000 square feet [3]	300 new jobs	2011 [3]
Ventura Foods, LLC	112,000 square feet (expansion) [1]	Retention of 400 manufacturing and related positions	2012 [1]
DeeTag USA	15,000 square feet		2010 [4]
Atlas Copco Secoroc LLC	19,000 square foot expansion		2010 [4]
US Xpress Enterprises, Inc		50 new jobs	2010 [4]
Letterkenny Army Depot		200 new jobs [4]	2010
Jennings Chevrolet Cadillac	$7.5 million dealership [4]		
Macy's Department Store		Will employ 1,900 people in four counties, including Franklin County [4]	2010(began construction) [4]
Tyco Electronics	7,000 square foot addition	100 new jobs	2010 [4]
DDS Inc.(Dillard's)	475,000 square feet	45 people	2010 [4]
Volvo Construction Equipment	$100 million expansion[5] 36,000 SF	600 jobs [5]	
Manitowoc Crane Group	18,000 square feet		2012 [6]
Gabler Trucking	39,000 square feet	retention of 75 jobs	2012 [6]
Olympic Steel	$11 million capital investment	90+ new jobs in three years	2012 [6]
Stouffer Mechanical Contractor Inc.	Expansion to 15,000 square feet		2012 [6]
Edge Rubber	35,000 square feet	60 new jobs in three years	2012 [6]

Sources

(1) http://www.fcadc.com/wp-content/uploads/2014/02/176626-2013-web.pdf pages 6, 9-10
(2) http://www.heraldmailmedia.com/news/tri_state/pennsylvania/fil-tec-inc-considers-move-to-wharf-road-industrial-park/article_44664920-7cc1-11e3-a518-001a4bcf6878.html

(3) http://articles.herald-mail.com/2011-11-08/news/30375998_1_ulta-beauty-distribution-center-unemployment

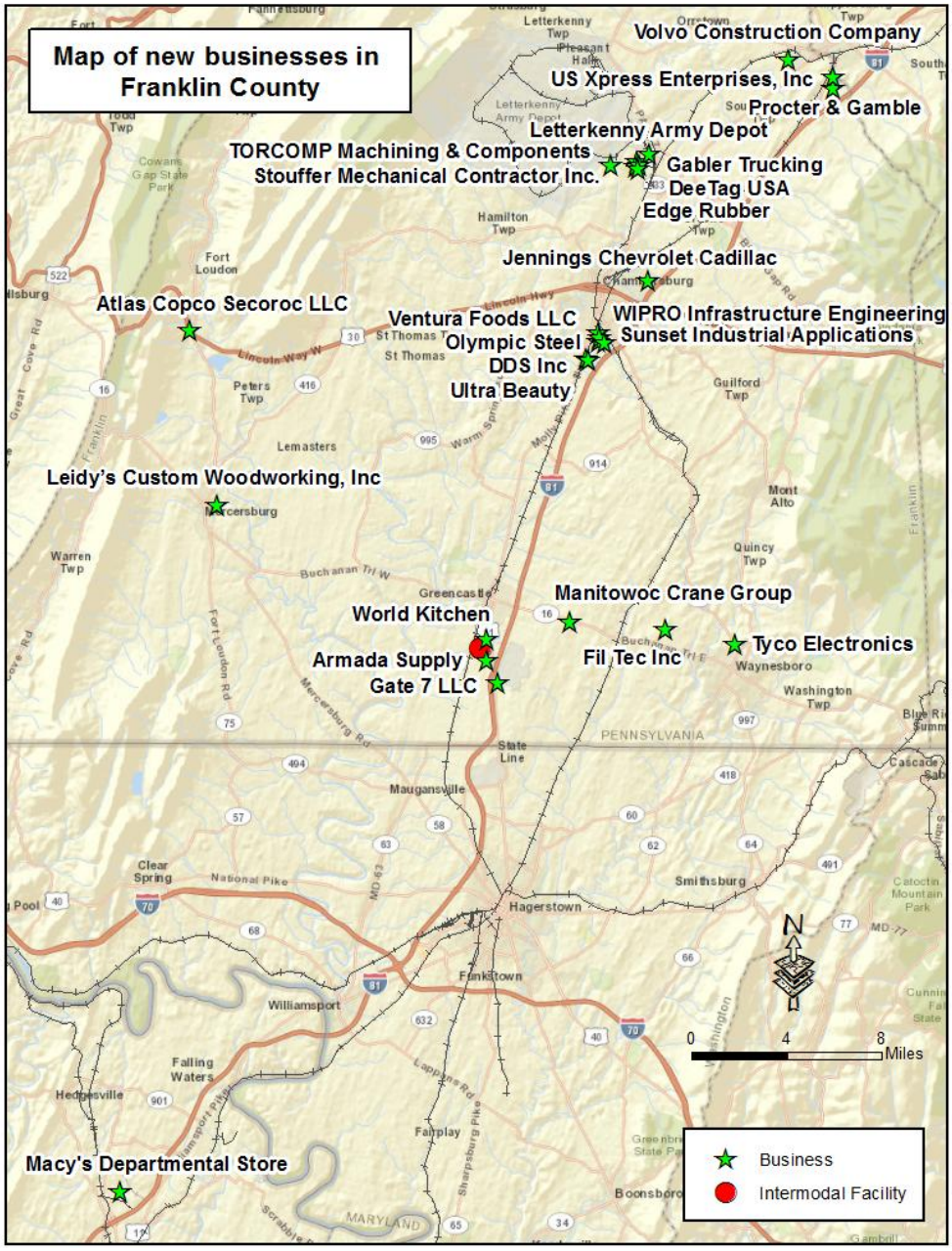
(4) 2010 Franklin County Area Development Corporation Annual Report p 11-12

(5) 2011 Franklin County Area Development Corporation Annual Report

(6) 2012 Franklin County Area Development Corporation Annual Report p12-13

Announcements with square footage and new employment estimates were averaged to produce an estimated employment per square foot of 1,942. In other words, every 1,942 square feet a business constructs or leases results in approximately one new employee. In total, approximately 3.7 million square feet were announced, and if the average holds true, approximately 1,905 new jobs resulted from those announcements. The announcements are mapped geographically in **Exhibit 80**.

Exhibit 80: New Business Announcements and Expansions near Greencastle Intermodal Facility



Source: Franklin County Area Development Corporation Annual Reports, 2010-2012

To determine what share of the Greencastle growth could occur at the Western Virginia Intermodal Facility, it is important to note the differences between the two facilities and their functionalities. Greencastle was constructed on 200 acres and is capable of 85,000 lifts per year, whereas the Western Virginia Intermodal Facility is expected to be constructed on 65 acres capable of handling 15,000 lifts per year. In addition, Greencastle is located along NS's Crescent Corridor, which serves domestic markets, and the Western Virginia Intermodal Facility is on the Heartland Corridor serving international markets. Assuming that the facilities function in a similar manner, which may or may not be a fair assumption, adjacent development to the Western Virginia Intermodal Facility as compared to Greencastle can expect to be tempered by:

- Lower demand and lift capacity
- Smaller site
- Geography limiting adjacent facilities
- Potential resistance to rezoning for industrial uses near the intermodal facility in Montgomery County
- Lower train volumes

As an upper bound, the analysis assumes that the Western Virginia Intermodal Facility would function in a similar manner as Greencastle in terms of attracting new and expanding businesses, but scaled to the annual lift capacity of the Elliston site. At 15,000 annual lifts, the Western Virginia Intermodal Facility would operate at 17.6% of Greencastle's capacity, which would imply that the Western Virginia region could attract up to 650,000 square feet of new development. Using the same employees per square foot of development as Greencastle, this would result in approximately 330 direct recurring jobs.

To determine the total number of jobs that could be generated from this upper bound scenario, it is assumed that the direct jobs would be equally split between warehouse/storage, truck transportation, and manufacturing industries in the Roanoke MSA. As with the construction impacts, employment could come from other adjacent MSAs in addition to those from the Roanoke MSA quantified below. These direct jobs would result in indirect (due to the additional final demand created in industries that support the warehouse/storage, truck transportation, and manufacturing) and induced employment (from the additional final demand created from the household spending of people directly and indirectly employed from the development) in the Roanoke MSA[57]. The potential total employment impact for the upper bound scenario is shown below in **Exhibit 81**.

Exhibit 81: Upper Bound Potential for Employment Gains from Development Attracted to the Roanoke MSA over Three Years

	Jobs
Direct Employment	
Warehouse/Storage	110
Truck Transportation	110
Manufacturing	110
Total Direct Employment	**330**
Total Employment (Direct, Indirect, and Induced)	
Warehouse/Storage	173
Truck Transportation	230
Manufacturing	233
Total Employment (Direct, Indirect, and Induced)	**636**

Source: AECOM Analysis

The employment and development at Greencastle are based on growth over three years (2010-2013). In order to more adequately estimate a longer-term forecast of growth over the 30-year analysis period, development at the Virginia Inland Port (VIP) at Front Royal, Virginia was analyzed. Originally intended by the Port of Norfolk to expand the market reach and compete with the Port of Baltimore, the facility began operations in 1989[58] and today has a capacity of 78,000 TEUs per year[59]. An absence of zoning and vision contributed to the lack of adjacent development initially, as evidenced by the golf course

[57] The employment impacts from the potential new development associated with the Western Virginia Intermodal Facility are estimated for the Roanoke, VA MSA based on the warehouse/storage, truck transportation, and an average of all manufacturing industries direct-effect employment multipliers from RIMS II. The direct-effect RIMS II multipliers for the region are 1.5763 (Warehouse/storage), 2.0952 (Truck transportation), and 2.1148 (average for all manufacturing industries).

[58] National Cooperative Freight Research Project (NCFRP) Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, CWS Consulting Group, LLC, May 2011, http://www.freightlocation.org/Downloads/ncfrp_w001.pdf

[59] Virginia Inland Port (VIP) Specs, Port of Virginia, http://www.portofvirginia.com/facilities/virginia-inland-port-vip/specs/

across the street from the VIP. Like the Western Virginia Intermodal Facility location, VIP has rail access by NS to the Port of Norfolk. By road, VIP is only one mile from I-66 and five miles from I-81, providing quick access to and from the larger population centers located along these major interstates. The adjacent land was previously undeveloped farm land, but the surrounding areas were supportive of its development to uses that would complement the intermodal facility. Development took time, in part due to competition with the Port of Baltimore, and in part because its original intent to compete with Baltimore evolved to what the facility is today: a complementary distribution center for the Port of Norfolk. As of 2011, VIP had attracted 39 companies that invested $747 million to develop 8.5 million square feet of facilities. These companies employ approximately 8,000, while VIP itself only directly employs 17[60].

The VIP cost approximately $13.3 million to build in 1987 and has operated in the black since 1994. The facility was developed through funds from the Virginia Transportation Trust Fund. It operates well below capacity, but contributes to millions of miles of truck traffic being taken off of Virginia's highways annually.

The Western Virginia Intermodal Facility could function similarly, while learning lessons from VIP's early days. One of VIP's strengths was its proximity to large population centers like Washington, D.C. and Baltimore which was attractive to distribution centers. Because the nearest population center to the Western Virginia Intermodal Facility is the Roanoke MSA, the potential of the number and size of distribution centers that could locate nearby is limited due to the size of the Roanoke MSA comparatively. Another lesson to be learned from VIP was that the adjacent land was not zoned properly, which limited the number and size of facilities that could locate nearest to the facility. The initial goal for the VIP also had to be adjusted as it grew, changing its vision and its function to better serve the need at the Port of Norfolk. In a similar way, perhaps the Western Virginia Intermodal Facility could function as a small-scale distribution center initially, but in the future as space near Greensboro and Prichard's facilities get maxed out, the Western Virginia Intermodal Facility could become a lower cost option with available space to relieve the pressure. Finally, the public assistance and incentives offered by the State of Virginia and the PPP with NS also contributed to its success[61].

As a high-end estimate, the Western Virginia Intermodal Facility and surrounding businesses could employ up to 4,300 after 30 years based on the growth experienced at VIP[62]. However, as noted above, the growth at the Western Virginia Intermodal Facility would not likely be at the same scale as experienced at VIP, but one would expect an initial surge in development, as outlined in **Exhibit 81**, followed by intermittent job gains over time.

Is there a Cost to Doing Nothing?

Just as there can be benefits to making investments, there can be costs to doing nothing and not capitalizing on opportunities. The bulk of this report has explored whether and how the Western Virginia region might realize benefits under a variety of investment scenarios—its financial and economic feasibility. This section considers the other side of the equation—whether there are costs associated with not investing.

In the broader economic sense, not constructing an intermodal facility in the Western Virginia region would result in the region's continued exclusion from industrial site selections that require or prefer intermodal connectivity. The region has a bulk facility in downtown Roanoke, but no intermodal container yard, which limits the region's ability to attract new or expanding businesses. Industries that are reliant on

[60] National Cooperative Freight Research Project (NCFRP) Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, CWS Consulting Group, LLC, May 2011, http://www.freightlocation.org/Downloads/ncfrp_w001.pdf

[61] National Cooperative Freight Research Project (NCFRP) Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, CWS Consulting Group, LLC, May 2011, http://www.freightlocation.org/Downloads/ncfrp_w001.pdf

[62] And factored by the capacities of the facilities.

the import or export of containers would seek the Western Virginia region only if they could cost effectively:

1. Truck containers to and from the Port
2. Truck containers to other nearby intermodal facilities for domestic distribution by rail
3. Truck finished goods locally

In an economy where reducing transportation cost is essential to being competitive, the lack of rail access would limit companies willing to locate in the region. Even more so, as the trucking industry continues to face driver shortages, increasing regulations on hours of service (HOS), and a shift from long-distance routes to shorter day trips, it will become increasingly difficult to find trucks for long-hauls, which will place a greater reliance on shippers' need for rail access. To that end, shippers who consider locating in the Western Virginia region, but ultimately choose competitor sites near Greensboro, Prichard, or Front Royal due to the presence of an intermodal facility, would be more likely to select the Western Virginia region if the facility were constructed.

Intermodal sites afford greater access to lower cost transportation options and the ancillary businesses that serve the facilities. As such, a region with an intermodal facility is strategically positioned to attract any number of freight-dependent industries, thereby spurring economic growth and diversity. In addition, the connection to rail and highway ensures that the region is connected to the wider regional economy and thereby global distribution networks. With the Western Virginia Intermodal Facility's location on two rail mainlines and one Interstate, the site is well situated for an intermodal facility. Considering the region's proximity to the Port of Norfolk both by truck and rail, the global economy is accessible within mere hours.

If an intermodal facility is not constructed in the Western Virginia region, the region risks losing the chance to become a regional hub for manufacturing, distribution, and warehousing. The situation is analogous to other infrastructure investments, including utilities, airports, and marine ports. Regions that have put the infrastructure in place are in better positions to attract businesses and developments in the future, because they have invested now. As global economies grow and get more integrated through faster shipments and better technology, it is increasingly important to be connected through all possible modes. An intermodal container facility would provide the region with this connection between highway and rail, ensuring that as the global distribution networks move to improve freight efficiencies, the region is able to capitalize on its strategic investment.

The analysis in the preceding sections shows that under current conditions:

1. The project's capital costs are not in balance with its lift capacity because of accessibility conflicts that have developed at the site. The facility cost per lift, as currently designed, is disproportionate with other similar facilities.
2. Initial demand to support the facility would need to be generated within the Western Virginia's economy. Freight from the Crescent Corridor or from the Port is not likely to be a substantial factor in its utilization. Collectively, these factors translate into low expected market demand in the initial years with an uncertain ramp up.
3. At present, there is not strong support for the facility as designed ten years ago and evaluated in this report.

That said, the report also found a large freight-dependent core to Western Virginia's economy and many major shippers interested in improvements. A redesigned facility could play an important role in supporting this part of the economy. Other freight initiatives that could support Western Virginia's freight economy include:

- Organization of a regional logistics team with the purpose of partnering shippers and manufacturers in the region and assisting in the coordination of inbound and outbound shipments and combining Less Than Truckloads (LTLs)
- Creation of a chassis and/or container pool with Port designation
- Construction or approving connections of rail-served sites

- Develop infrastructure/policies that encouraging shorter drays due to the shortage of and difficulty in attracting long-haul truckers
- Improve infrastructure/policies to reduce the need for weight restrictions
- Improve coordination between states for overweight permissions
- Construct truck-stops in the region
- There is limited grain production, but a silo for packing it in containers would be beneficial

Is there a cost to not building the facility as envisioned ten years ago today? No, the physical characteristics of the site and the competitive environment in which the facility would operate have changed in ways that make this design less desirable than once anticipated. Is there a cost to not making investments to support Western Virginia's freight economy—yes—but the shape those investments take to support the economy has changed since ten years ago with the evolution of Western Virginia's economy and the broader competitive environment.

There is also a cost to uncertainty. Large public capital investments are irreversible commitments of land and financial resources. When there are uncertainties about the commitment to and timing of such investments, the private market will delay making complementary investments in firms and equipment in order to ensure that their own resources are applied in the most profitable opportunities. Thus, uncertainty concerning freight investments—an intermodal facility or other freight investment—likely will constrain growth as the private market takes a "wait and see" position and potentially chooses to locate, expand, or relocate outside the region.

Considerations and Conclusions

The results above highlight a number of features about the project's feasibility in today's conditions. These are summarized in the discussion below.

Economic Feasibility

- From an economic impact perspective, there are scenarios under which the project is an economic success. Moreover, of the benefits estimated, shipper savings are the largest single outcome. Because the facility is likely to be used predominantly by local firms in the broader Western Virginia region to access a larger domestic region, this benefit is notable because the shipper savings are likely to be enjoyed primarily by these local firms. This is a benefit that is largely experienced locally.

The majority of project benefits are experienced not just in Western Virginia, but state-wide or interstate.

- The shipper benefits represent the projected savings offered by the project. These are the catalyst for economic development impacts such as jobs and earnings as firms locate to take advantage of shipper savings.
- The majority of project benefits from the BCA, however, are experienced in a more spatially diffuse region—emissions, pavement wear, congestion, and safety benefits for example—and are not constrained to the Western Virginia region. These are real benefits but are more state and interstate in their generation and not confined to Western Virginia.
- Western Virginia is not the only beneficiary. On net, the majority of the economic benefits in the BCA are likely experienced outside of the Western Virginia region.
- The location of the facility in relation to the Port of Virginia limits the size of the market that it will serve. Because of the comparatively short distance to the Port, the cost and time of using rail is not competitive with trucking.
- Though this is a comparatively small facility as designed, there is precedent for a small facility to grow and evolve as evidenced by the Virginia Inland Port at Front Royal. Consistent with the literature review, this facility would predominately serve the local export market. Low volume terminals have a harder time maintaining customers if train frequencies are below three per week and competing for containers as ocean carriers prefer to supply higher volume facilities.

Financial Feasibility

- From a financial return perspective, the project requires a subsidy under most scenarios and discount rates. A recent review of new inland intermodal facilities shows almost all have been constructed with a majority of public funds. A private operator would consider this investment given the projected operating revenues from lift fees cover the operating costs. Under all scenarios, the project covers 112% to 212% of its operating costs.

Under all scenarios, the project more than covers its operating costs.

- Considering only the annual operating costs and the revenues from lift fees, the facility could bring in enough to cover the operating expenses and have some left over to put towards the capital loan, if one could be secured.

What's Changed?

- Many things have changed since the project was first studied. One of the most surprising results from this study is that the most influential change to affect the project's feasibility compared with the past is the project's cost, not external factors such as a lingering recession, port traffic, or new trade patterns. The project's cost is now more than double its estimated cost when first

conceived. This cost increase is driven by physical changes at the selected site that require additional road and track work that would not have been required ten years ago. These cost increases make the project financially infeasible at the projected scale of activity.

- Unlike the past, there is no identified "anchor user" for the facility. In the past, the facility's owner had been able to identify a user that would account for a significant share of business from opening day. While many users contacted for this study indicated that they would use this facility and/or would have interest in it, none indicated sufficient volumes to account for a significant share of the facility. The facility's owner will have to assemble volumes from multiple small shipments from day one.
- Past studies did not evaluate the facility as a stand-alone operation but rather as part of the much larger Heartland Corridor system.

What Could be Done?

- Because the project has economic benefit to the region, it could be beneficial to consider an alternative scale for the facility. Changing the design and scale of the facility could be reconsidered which could allow the region to receive a similar level of economic benefits for a much lower cost. Due to the discovery that neither 15,000 annual lifts nor 65 acres are dictated by market or physical conditions, it is conceivable that a smaller Phase I of a facility could be viable, reducing the initial capital costs.
- The analysis considers a maximum lift capacity of 15,000 lifts per year throughout the analysis period. This results in the need to "cap" the first two scenarios even though the theoretical volumes that result from the markets would be higher than the 15,000 lifts. If the facility were able to handle more lifts, it could bring in more revenue.
- Capital subsidies from the Commonwealth would lower the capital cost of the facility, which removes some of the financial risk from the operator but does not remove the risk of the performance measure.
- Other capital funding sources could be sought, such as value-capture from real estate developments, a TIGER grant, or development donations.

Due to the discovery that neither 15,000 annual lifts nor 65 acres are dictated by market or physical conditions, it is conceivable that a smaller Phase I of a facility could be viable, reducing the initial capital costs.

Choose an Alternate Design

The selection of the site location for the facility at Elliston has presented challenges. First, the site is space constrained by being immediately surrounded by mountains, a river, and a local highway. Second, the facility use is counter to the current zoning in the Montgomery County Comprehensive Plan[63], though the 2025 policy map shows the facility site as zoned for mixed use. Regardless, it is likely that more litigation would follow if and when construction of the facility progresses because of Montgomery County's resistance to the facility location. Third, the current scale of the site is not economical for the proposed utilization of 15,000 lifts. And finally, an alternate site may require less infrastructure costs by not necessitating the relocation of a road and bridge, as are required at Elliston, and may offer the possibility of scaling down the size of the facility footprint. However, because the location of the facility is not negotiable, the scale of the facility should be revisited.

The scale of the facility affects the capital costs associated with the site development. The 65-acre site may be larger than necessary for the 15,000 lift per year operation that is planned. Preparing and paving such a large acreage is contributing to a portion of the capital costs and those costs could be avoided if the site only prepared and paved the portion of land that is needed for the actual operation and storage. By reducing the scale of the facility from 65 acres to cover only the acreage needed, capital costs of the

[63] Montgomery County Planning & Land Use 2025 Plan, Adopted 10/12/04 and Revised 6/13/2011

facility construction decrease; and as a result, the benefit cost ratios will increase to make the project more financially feasible for the owner/operator.

It is possible to handle significantly more than 15,000 lifts using a smaller footprint, thereby reducing initial capital costs.

An analysis was done considering the space constraints and operations at a typical intermodal facility. Using an operational "rule of thumb" that a facility can handle approximately 4,000 lifts per acre per year, as well as the space for the lead track and other operations, an alternate cost estimate considered how the site might more effectively be used. The estimate considers the cost of a facility in the same location but with a reduction of the paved area from 65 acres to approximately 51.5 acres, still allowing for plenty of space for parking and storage. In addition, the space could theoretically handle 100,000 lifts per year, assuming that 25 acres are used for the actual facility and the remaining acreage is paved for other uses. The 4,000 lifts per acre assumption comes from industry experience and falls within the range of 2,000[64] to 5,400[65] lifts per acre for intermodal facilities used in other research. In reducing the paved area, the capital cost of the facility is reduced to approximately $70.9 million, a savings of $6.68 million by just reducing pavement space. From a total economic perspective, this reduced cost results in the BCRs of Scenarios 1 and 2 becoming greater than 1.0 at the 4% discount rate, whereas previously (see **Exhibit 61** and **Exhibit 62**) only the 3% discount rate resulted in BCRs above 1.0. The BCRs for Scenarios 1 and 2 under the reduced facility cost are shown in **Exhibit 82** and **Exhibit 83**.

Exhibit 82: BCR for Scenario 1 under Reduced Facility Cost ($70.9M)

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Capital Cost	$ 51.84	$ 52.67	$ 53.38	$ 53.93	$ 54.25
Total Benefits	$ 35.88	$ 41.23	$ 47.82	$ 56.02	$ 66.31
BC Ratio	**0.69**	**0.78**	**0.90**	**1.04**	**1.22**

Source: AECOM

[64] 2,000 lifts per acre per year from the Midwest Regional University Transportation Center's report on the Twin Ports Intermodal Freight Terminal Study, July 15, 2003. http://www.dot.state.mn.us/ofrw/PDF/Twin%20Ports%20Intmdl%20Terminal%20Study%20-%20FINAL.pdf

[65] 5,400 lifts per acre per year from HDR WHI Report on Comparative Analysis of a Multi-Use Rail Served Port Facility, October 6, 2009. https://www.portlandoregon.gov/bps/article/279955

Exhibit 83: BCR for Scenario 2 under Reduced Facility Cost ($70.9M)

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Capital Cost	$ 51.96	$ 52.79	$ 53.51	$ 54.07	$ 54.40
Total Benefits	$ 37.27	$ 42.84	$ 49.70	$ 58.23	$ 68.93
BC Ratio	**0.72**	**0.81**	**0.93**	**1.08**	**1.27**

Source: AECOM

Taken one step further, the analysis considered the minimum size necessary for the facility to operate at full capacity (15,000 lifts per year). Because the design and operating plans of the site are not finalized, and because the degree of uncertainty increases with lower volumes, the rule of thumb of 4,000 lifts per acre was reduced to 3,000 lifts per acre and a contingency of 50% was added. Using these assumptions, the facility could theoretically handle the 15,000 lifts per year on eight acres. Reducing the facility footprint would reduce the overall cost of the facility[66], and could also reduce the annual operating expenses.

While this analysis illustrates that reducing the paved space would save millions in capital costs, the analysis also shows that there are a number of fixed costs associated with the intermodal facility for proper operations that cannot be avoided regardless of lift capacity. Recent trends have shown that intermodal facilities tend to have greater lift capacities and to be located in areas with greater demand due to the significant fixed costs associated with building an intermodal facility. Because the lift capacity of the facility is based on market demand in the region, it is unlikely that the facility would be constructed at that size. Another option to consider that could reduce the capital costs is the necessity of rebuilding and relocating Cove Hollow Road and the associated bridge. It would be advantageous to investigate whether and how those investments could be avoided or constructed in a manner that would reduce the costs as well as the impacts to the natural environment, if possible.

Remove the Lift Cap

To test the BCR sensitivity to volumes under alternate circumstances, the cap on the number of lifts that the facility is capable of handling (15,000 per year) was removed. In doing so, the factor applied to Scenario 1 was removed and the container volumes in both Scenarios 1 and 2 were allowed to grow throughout the analysis period[67]. This resulted in a higher demand and, therefore, higher lift revenues and VMT avoided for both scenarios. The analysis under these assumptions more adequately reflects the benefits and costs under the higher demand, assuming that that the facility could theoretically handle it. In addition, the operating costs for Scenario 1 were increased to reflect the need for longer operating hours and employees to handle the higher volumes.

Scenario 1: Most Optimistic

By removing the lift cap on Scenario 1, the initial demand in 2019 reached 74,645 TEUs, or 37,323 containers[68] resulting in 37,323 lifts in opening year. The volumes grew at 2.01% per year throughout the analysis period, resulting in 66,525 containers and lifts per year in 2048. The resulting VMT avoided went from 8.7 million in 2019 to 15.4 million in 2048. With longer hours needed to process the increased volume of containers, the annual O&M costs were increased to $1 million per year. Under Scenario 1,

[66] The cost savings of these scaled-down facilities are difficult to estimate without more information on the site layout and operations.

[67] Scenarios 3 and 4 did not reach the 15,000 lifts per year cap, so this analysis does not affect the BCRs

[68] Assumes all containers are 40-foot units

the benefit cost ratios show that the project is beneficial for the region at all discount rates, as seen in **Exhibit 84**.

Exhibit 84: Scenario 1 BCR with No Lift Cap

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 9.47	$ 10.90	$ 12.65	$ 14.78	$ 17.41
Less Lift Fee Revenues	*$ 39.11*	*$ 45.61*	*$ 53.59*	*$ 63.49*	*$ 75.86*
Total Costs	***$ 33.26***	***$ 30.05***	***$ 25.72***	***$ 19.96***	***$ 12.30***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 9.11	$ 10.63	$ 12.49	$ 14.79	$ 17.67
Congestion Savings	$ 10.64	$ 12.41	$ 14.59	$ 17.28	$ 20.65
Shipper Savings	$ 47.66	$ 55.57	$ 65.31	$ 77.37	$ 92.44
Emissions	$ 5.06	$ 5.87	$ 6.86	$ 8.09	$ 9.62
CO2	$ 8.95	$ 8.95	$ 8.95	$ 8.95	$ 8.95
Safety	$ 24.51	$ 28.59	$ 33.59	$ 39.80	$ 47.55
Total Benefits	***$ 107.41***	***$ 124.03***	***$ 144.56***	***$ 170.12***	***$ 202.21***
BC Ratio	**3.23**	**4.13**	**5.62**	**8.52**	**16.44**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010
Source: AECOM

If the region were able to capture volumes of this magnitude, then no additional subsidy (capital or operating) would be needed for the facility to function financially from the public's perspective. Alternately, even with these higher volumes, the facility does not break even (with or without residual benefits) unless the discount rate is 4% or lower, as seen in **Exhibit 85**.

Exhibit 85: Scenario 1 R/C Ratio with No Lift Cap, Including Residual

	Scenario 1: Identified Shippers Represent 20% of Market, Most Optimistic				
	30 Year Analysis Period (2019-2048)				
	Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Total Cost	$ 52.21	$ 54.89	$ 57.92	$ 61.39	$ 65.42
Total Revenues	$ 40.57	$ 47.61	$ 56.37	$ 67.33	$ 81.19
R/C Ratio	**0.78**	**0.87**	**0.97**	**1.10**	**1.24**

Note: Revenues include Residual Benefits
Source: AECOM

Scenario 2: Optimistic

By removing the lift cap on Scenario 2, the initial demand in 2019 was 28,630 TEUs, or 14,315 containers[69] as was the same in the original analysis with the lift cap. However, the volumes grew at 1.01% per year throughout the analysis period and were not capped in year 2024, resulting in 19,139 containers and lifts per year in 2048. The resulting VMT avoided went from 3.5 million in 2019 to 4.7 million in 2048. Because the operation at this scale is not much different than the original analysis, the annual O&M costs were held at $750,000 per year. Under Scenario 2, the benefit cost ratios show that the project is beneficial for the region at the 3% and 4% discount rates, as seen in **Exhibit 86**.

[69] Assumes all containers are 40-foot units

Exhibit 86: Scenario 2 BCR with No Lift Cap

	Scenario 2: Identified Shippers Represent 40% of Market, Optimistic 30 Year Analysis Period (2019-2048) Values stated in 2014 $M				
	Discount at 7%	Discount at 6%	Discount at 5%	Discount at 4%	Discount at 3%
Costs					
Capital Costs	$ 62.90	$ 64.75	$ 66.67	$ 68.67	$ 70.75
O&M	$ 7.10	$ 8.18	$ 9.49	$ 11.09	$ 13.06
Less Lift Fee Revenues	*$ 13.49*	*$ 15.63*	*$ 18.25*	*$ 21.47*	*$ 25.47*
Total Costs	***$ 56.51***	***$ 57.30***	***$ 57.91***	***$ 58.28***	***$ 58.34***
Benefits					
Residual	$ 1.46	$ 2.01	$ 2.77	$ 3.84	$ 5.33
Pavement Savings	$ 3.28	$ 3.80	$ 4.43	$ 5.21	$ 6.19
Congestion Savings	$ 3.78	$ 4.38	$ 5.11	$ 6.01	$ 7.13
Shipper Savings	$ 17.31	$ 20.06	$ 23.42	$ 27.56	$ 32.69
Emissions	$ 1.85	$ 2.13	$ 2.47	$ 2.90	$ 3.42
CO2	$ 3.13	$ 3.13	$ 3.13	$ 3.13	$ 3.13
Safety	$ 8.91	$ 10.32	$ 12.05	$ 14.17	$ 16.82
Total Benefits	***$ 39.71***	***$ 45.82***	***$ 53.38***	***$ 62.82***	***$ 74.70***
BC Ratio	**0.70**	**0.80**	**0.92**	**1.08**	**1.28**

*Climate Change benefits are only discounted at 3% per Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, Feb 2010
Source: AECOM

Scenarios 3 and 4
Neither Scenario 3 nor 4 reaches the 15,000 container per year lift capacity in the analysis, so removing the lift cap has no effect on the benefit cost ratios in either scenario.

Reduced Facility Size
Taken one step further, the analysis considered the minimum acreage necessary for the facility to operate at Scenario 1's full capacity (66,000 lifts per year). Because the design and operating plans of the site are not finalized, the rule of thumb of 4,000 lifts per acre was used and a contingency of 20% was added. Using these assumptions, the minimum footprint needed to accommodate 66,000 lifts per year is approximately 20 acres. NS already owns 43 acres at the Elliston location and could theoretically operate the facility on the single largest parcel that totals 22 acres. Reducing the facility footprint would reduce the overall cost of the facility[70], and could also reduce the annual operating expenses.

[70] The cost savings of these scaled-down facilities are difficult to estimate without more information on the site layout and operations.

The necessity of an additional subsidy is not unique to the Western Virginia Intermodal Facility and should not be considered the facility's largest impediment, but instead one of the challenges that can more easily be solved, as public funds have been used for Greer, SC and Greencastle, PA.

Capital Subsidies

Finally, if the Commonwealth were to offer an additional capital subsidy for the facility, then an operator would be more willing to take on the risk of meeting the performance measures as stipulated in the agreement between the state and NS. As the scenarios stand now, Scenarios 1 and 2 offer benefit cost ratios of greater than 1.0 under a 3% discount rate from the Commonwealth's perspective. From an operator's perspective, large capital subsidies will be needed to construct the facility as it is designed to date. The subsidies needed for the facility owner/operator to reach an R/C ratio of 1.0 at a 7% discount rate for each scenario are displayed in **Exhibit 87** below. When the lift cap is removed, Scenario 1 would only need an additional subsidy of $16.3 million because of the revenues generated by the lift fees.

Exhibit 87: Capital Subsidy Required for Scenarios 1-4, Excluding Residual

	Total Subsidy Required (includes $25M already dedicated) to reach R/C Ratio of 1.0 at 7% discount rate, $M	Additional Subsidy With Lift Cap (excludes $25M already dedicated), $M	Additional Subsidy Without Lift Cap (excludes $25M already dedicated), $M
Scenario 1: Most Optimistic	$ 71.00	$ 46.00	$ 16.30
Scenario 2: Optimistic	$ 71.10	$ 46.10	$ 45.00
Scenario 3: Pessimistic	$ 71.70	$ 46.70	$ 46.70
Scenario 4: Most Pessimistic	$ 77.30	$ 52.30	$ 52.30

Source: AECOM

This would not be the only facility to require a capital subsidy to get constructed. Some of the nearest competitor facilities, listed in **Exhibit 88**, also required subsidies from the public sector in order to get the facility constructed. As a result, the necessity of an additional subsidy is not unique to the Western Virginia Intermodal Facility and should not be considered the facility's largest impediment, but instead one of the challenges that can more easily be solved through a TIGER grant or other such source.

Exhibit 88: Capital Subsidies for Intermodal Facilities

Facility	Opening Year	Total Cost	Subsidies
Virginia Inland Port	1989	$13 million[1]	$13 million paid by state of Virginia[1]
Greencastle Intermodal Facility	2013	$97 million[2]	$45 million paid by state of Pennsylvania[2]
Charlotte Intermodal Facility	2013	$104.1 million ($94.4 for intermodal facility; $9.7 million for public road construction)[3]	$14.1 million from SAFETEA-LU $25 million requested from a TIGER Discretionary Grant $2.8 million from North Carolina Department of Transportation $4.0 million from the City of Charlotte[3]
Greer	2013	$51 million	$43.5 million from South Carolina Ports Authority[4]

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(3) Cappuccio, Lauren, "Officials dedicate Franklin County Regional Intermodal Facility," Public Opinion, June 12, 2013, http://www.publicopinionline.com/ci_23438867/officials-dedicate-franklin-county-regional-intermodal-facility
(4) Leach, Peter T, "Michelin Plant to Drive Tire Volumes Through Charleston," Journal of Commerce, January 28, 2014, http://www.joc.com/port-news/us-ports/port-charleston/michelin-plant-drive-tire-volumes-through-charleston_20140128.html

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Appendix A: AECOM Capital Cost Estimate

Item No.	Description	Estimated Quantity	Bid Quantity	Unit		Unit Cost	Subtotal	Work Item Total	Division Totals
	PRE-CONSTRUCTION COSTS								
	Division 0-Preconstruction Services							$268,650	$270,000
0.001	Pre-construction Services (Lump Sum)	0.5%		LS			$268,650		
	CONSTRUCTION COSTS								
	Division 1-General Requirements							$6,811,250	$6,820,000
1.001	Permitting (Local Permits - lump sum)	0.5%		LS			$268,650		
1.002	Design-Builder Mobilization	4.0%		LS			$2,149,200		
1.003	General Conditions	4.5%		LS			$2,417,850		
1.004	Performance & payment Bonds (2%)	2.0%		LS			$1,074,600		
1.005	Insurance (1%)	1.0%		LS			$537,300		
1.006	MOT (0.5%)	0.5%		LS			$268,650		
1.007	Field Office	1		EA		$85,000	$85,000		
1.008	Project Record documents	1		LS		$10,000	$10,000		
	Division 2-Terminal Site Construction								$37,650,000
	Land Preparation							$2,075,000	
2.001	Clearing & Grubbing	15		AC		$5,000	$75,000		

2.002	Pavement to be Sawcut	0		LF		$10	$0		
2.003	Pavement Removal	20,000		SY		$100	$2,000,000		
	Site Preparation							$5,990,000	
2.004	Topsoil Striping (6") and Placement in Mound Areas	170,000		CY		$20	$3,400,000		
2.005	Excavation of Material	120,000		CY		$10	$1,200,000		
2.006	Embankment	0		CY		$5	$0		
2.007	Haul and Dispose of Excess Excavated Material	120,000		CY		$10	$1,200,000		
2.008	Demolition-Removal of Guardrail and Signs	0		LF		$4	$0		
2.009	Demolition-Removal of Fences and Gates	0		LF		$5	$0		
2.010	Demolition-Removal of Concrete	0		CY		$1,000	$0		
2.011	Demolition-Removal of Weigh Scale	0		LS		$18,000	$0		
2.012	Demolition-Removal of Electric & Light Poles, Phone, Comm.	5		LS		$30,000	$150,000		
2.013	Remove & Disposal of Existing Buildings	4		EA		$10,000	$40,000		
	Terminal Paving Total							$18,509,000	
	Miscellaneous							$0	
2.014	2" Milling of Existing Pavement	0		SY		$5	$0		
2.015	6" Compacted Gravel Access Road	0		SY		$5	$0		
	Entrance / Canopy Area							$165,000	
2.016	9” Portland Cement Concrete for Entrance and Exit Canopy Area	2,500		SY		$60	$150,000		
2.017	6” Compacted Aggregate Base Course for Entrance and Exit Canopy Area	2,500		SY		$6	$15,000		
	Craneway / Container Staking Area							$8,700,000	

2.018	16” Portland Cement Concrete or 16” Roller Compacted Concrete for Craneway and Stacked Container Area	75,000		SY		$110	$8,250,000		
2.019	6” Compacted Aggregate Base Course for Craneway and Stacked Container Area	75,000		SY		$6	$450,000		
	Roller Compacted Concrete Pavement - Exterior Lot							$6,720,000	
2.060	9" Roller Compacted Concrete	120,000		SY		$50	$6,000,000		
2.061	5" Roller Compacted Concrete	0		SY		$35	$0		
2.062	6" Aggregate Base	120,000		SY		$6	$760,000		
	Portland Cement Concrete Pavement							$0	
2.063	9" Portland Cement Concrete	0		SY		$60	$0		
2.064	5" Portland Cement Concrete	0		SY		$50	$0		
2.065	6" Aggregate Base	0		SY		$6	$0		
	Asphalt Pavement - Relocated Road							$2,924,000	
2.066	2" Asphalt Surface Course	4,800		TONS		$100	$480,000		
2.067	4" Asphalt Base Course	9,500		TONS		$160	$1,520,000		
2.068	2" Asphalt Base Course	4,800		TONS		$80	$384,000		
2.069	12" Dense Graded Stone	45,000		SY		$12	$540,000		
2.070	6" Dense Graded Stone	0		SY		$7	$0		
	Curbing, Sidewalk and Pavement Markings							$325,000	
2.020	Medium Duty Curb, Complete	0		LF		$45	$0		
2.021	Standard Duty Curb	11,200		LF		$25	$280,000		
2.022	Standard Duty Curb and Gutter	0		LF		$30	$0		
2.023	Sidewalk, Complete Section / 5" Concrete Sidewalk	0		LS		$5	$0		
2.024	Pavement Markings	1		LS		$45,000	$45,000		

	Fence & landscaping							$937,500	
2.025	8' Compacted Chain Link Fencing with 3-Strand Barbed Wire	9,000		LF		$65	$585,000		
2.026	Double Swing Security Gate (Chain Link)	4		EA		$10,000	$40,000		
2.027	Signage (Main Entrance)	0		LS		$50,000	$0		
2.028	Signage (Directional)	0		LS		$30,000	$0		
2.029	Pipe Bollards (10")	40		EA		$500	$20,000		
2.030	Concrete Road Barrier	0		LF		$110	$0		
2.031	Steel Guardrail	11,200		LF		$20	$224,000		
2.032	Arm Gate at canopy and POV Lot	5		EA		$3,700	$18,500		
2.033	Lift Gate at Monroe Street Yard	0		EA		$58,160	$0		
2.034	Landscaping and Grass establishment	1		LS		$50,000	$50,000		
	Storm Water Management							$2,167,500	
2.035	Manhole	0		EA		$7,500	$0		
2.036	Curb Opening Inlet	0		EA		$5,000	$0		
2.037	Catch Basin	20		EA		$4,000	$80,000		
2.038	Flared End Section	20		EA		$2,500	$50,000		
2.039	15" Storm Sewer Pipe	0		LF		$75	$0		
2.040	18" Storm Sewer Pipe	0		LF		$100	$0		
2.041	24" Storm Sewer Pipe	6,000		LF		$150	$900,000		
2.042	36" Storm Sewer Pipe	0		LF		$200	$0		
2.043	60" Storm Sewer Pipe	0		LF		$350	$0		
2.044	6" Perforated Underdrain	2,250		LF		$20	$45,000		
2.045	Remove and Replace 6" PVC Pipe	0		LF		$40	$0		
2.046	Rip Rap - Pond protection	50		TONS		$50	$2,500		

2.047	Stormwater Management Water Quality Facility	2		EA		$125,000	$250,000		
2.048	Soil Sediment and Erosion Control	1		LS		$750,000	$750,000		
	Storm Water Management - Detention Basins	7,500		CY		$12	$90,000		
	Sanitary							$349,960	
2.049	6" Sanitary Service Line	1,500		LF		$131	$196,860		
2.050	Replace existing 15" sanitary	800		LF		$175	$140,000		
2.051	Sanitary Sewer Manhole	1		EA		$3,100	$3,100		
2.052	Sanitary Sewer Tap to Existing Line	2		EA		$5,000	$10,000		
	Domestic water & fire protection							$989,000	
2.053	8" Water Main - Ductile Iron (includes hydrant leads)	8,000		LF		$100	$800,000		
2.054	8" Water Main Valves	25		EA		$1,800	$45,000		
2.055	Fire Hydrant including Bollard Protection	20		EA		$4,500	$90,000		
2.056	8" Water Meter with Backflow Preventer (Including Vault)	2		EA		$22,000	$44,000		
2.057	Stainless Steel Tapping Sleeve Connection	2		EA		$5,000	$10,000		
	Structural							$6,300,000	
2.058	Carrolton Viaduct Walkway & Railing	0		LF		$400	$0		
2.059	Retaining Wall	0		SF		$102	$0		
	New Highway Bridge	8,400.00		SF		$750	$6,300,000		
	Division 3-Concrete Structure								$0
3.001	Stairway	0		EA		$15,000	$0		
3.002	Combined Crane Foundation	0		LF		$650	$0		
3.003	Crain Rail Foundation Fasteners, complete	0		LF		$350	$0		

3.004	Crane Rail Electric Vaults (w/ cable rack)	0		LF		$100,000	$0		
3.005	Crane Bumpers	0		EA		$20,000	$0		
	Division 5-Trackwork								$5,990,000
5.001	Concrete Grade Crossing	450		TF		$1,250	$562,500		
5.002	Normal Duty Grade Crossing	0		TF		$750	$0		
5.003	Track, ballast and OTM (136 CWR) / New Track - Main	10,000		TF		$200	$2,000,000		
5.004	Track, ballast and OTM (136 CWR) / New Track - Yard	9,000		TF		$175	$1,575,000		
5.005	Turn out no 10	2		EA		$125,000	$250,000		
5.006	New No. 15 Crossovers	6		EA		$260,000	$1,560,000		
5.007	Remove Track - Rail, OTM, Ties (Includes Salvage Credit)	2,000		TF		$20	$40,000		
5.008	Turnout Removal	0		EA		$6,500	$0		
	Division 6-Buildings & Canopy								$910,000
6.001	Pre-Engineered Canopy Structure & Foundation Complete - Includes Excavation, Backfill, Foundations, Structure, Lane Signs, Light Fixtures, Conduit, Electrical Work & Roof Drains	1		EA		$128,000	$128,000		
6.002	Administration Building	1,440		SF		$275	$396,000		
6.003	Existing Maintenance Building	0		SF		$128	$0		
6.004	Maintenance Building	1,500		SF		$251	$376,500		
	Division 15- Mechanical								$590,000
15.001	Compressed Air - 3 In Mains	3,000		LF		$164	$492,150		
15.002	Relocate Compressor & Compressed Air Building	1		EA		$20,000	$20,000		
15.003	Compressed Air Stations / Service Box - 2 In	0		EA		$2,500	$0		
15.004	Oil Water Separator	1		EA		$40,000	$40,000		

15.005	1000 Gallon Storage Tank with Containment, Alarm and Dispenser	1		EA		$30,000	$30,000		
	Division 16 Electric, Communication and CCTV								$1,500,000
	LUMP SUM	1		EA		$1,500,000	$1,500,000		
	Subtotal Construction Costs								**$53,730,000**
	CONTINGENCY							**$8,060,000**	
	Contingency	15.0%					$8,059,500		
	ENGINEERING-Final Design							**$780,000**	
		1%					$772,375		
	Total Construction Cost								**$62,570,000**
	ENGINEERING/CONSTRUCTION MANAGEMENT COSTS							**$1,260,000**	
	Construction Management	4.0%					$1,251,400		
	CRANE / SIGN REMOVAL or RELOCATION/ PROPERTY COSTS							**$9,200,000**	
	2-double Cantilever WSC and 2	0		LS		$6,000,000	$0		

	Hostlers								
	2 - Top Pick Machines	0		EA		$750,000	$0		
	Property Acquisition	1		LS		$9,200,000	$9,200,000		
	Overhead Sign removal	1		LS			$0		
	Overhead sign relocation	1		LS			$0		
	C & S AND TECHNOLOGY COSTS							**$3,500,000**	
	C&S	1		LS		$3,000,000	$3,000,000		
	Gate Technologies	1		LS		$500,000	$500,000		
	Environmental COSTS							**$1,000,000**	
	Stream and Wetland Mitigation	1		AC		$500,000	$500,000		
	Environmental Clean-up	1		LS		$0	$0		
	Environmental Due Diligence	1		LS		$500,000	$500,000		
	Total Other Costs								**$14,960,000**
	TOTAL PROJECT COST								**$77,530,000**

Notes:
1. Unit Abbreviations: TF = Track Feet; LF = Linear Feet; LS = Lump Sum; CY = Cubic Yard; SF = Square Feet; SY= Square Yard; AC=Acre; EA=Each

Appendix B: List of Counties in the Broad Region

Maryland	North Carolina	Ohio	Pennsylvania	South Carolina	Tennessee	Virginia	West Virginia
Allegany	Alamance	Athens	Bedford	Cherokee	Carter	Albemarle	Barbour
Calvert	Alexander	Belmont	Fayette	Chester	Claiborne	Alexandria	Berkeley
Charles	Alleghany	Gallia	Franklin	Chesterfield	Cocke	Alleghany	Boone
Frederick	Anson	Guernsey	Fulton	Darlington	Grainger	Amelia	Braxton
Garrett	Ashe	Hocking	Greene	Dillon	Greene	Amherst	Cabell
Montgomery	Avery	Jackson	Somerset	Fairfield	Hamblen	Appomattox	Calhoun
Prince George's	Beaufort	Lawrence	Washington	Greenville	Hancock	Arlington	Clay
St. Mary's	Bertie	Meigs	Westmoreland	Kershaw	Hawkins	Augusta	Doddridge
Washington	Bladen	Monroe		Lancaster	Jefferson	Bath	Fayette
	Buncombe	Morgan		Marlboro	Johnson	Bedford	Gilmer
	Burke	Muskingum		Spartanburg	Sullivan	Bedford	Grant
	Cabarrus	Noble		Union	Unicoi	Bland	Greenbrier
	Caldwell	Perry		York	Washington	Botetourt	Hampshire
	Camden	Pike				Bristol	Hardy
	Caswell	Scioto				Brunswick	Harrison
	Catawba	Vinton				Buchanan	Jackson
	Chatham	Washington				Buckingham	Jefferson
	Chowan					Buena Vista	Kanawha
	Cleveland					Campbell	Lewis
	Craven					Caroline	Lincoln
	Cumberland					Carroll	Logan
	Davidson					Charles City	Marion
	Davie					Charlotte	Marshall
	Duplin					Charlottesville	Mason

Maryland	North Carolina	Ohio	Pennsylvania	South Carolina	Tennessee	Virginia	West Virginia
	Durham					Chesapeake	McDowell
	Edgecombe					Chesterfield	Mercer
	Forsyth					Clarke	Mineral
	Franklin					Colonial Heights	Mingo
	Gaston					Covington	Monongalia
	Gates					Craig	Monroe
	Granville					Culpeper	Morgan
	Greene					Cumberland	Nicholas
	Guilford					Danville	Ohio
	Halifax					Dickenson	Pendleton
	Harnett					Dinwiddie	Pleasants
	Haywood					Emporia	Pocahontas
	Henderson					Essex	Preston
	Hertford					Fairfax	Putnam
	Hoke					Fairfax	Raleigh
	Iredell					Falls Church	Randolph
	Johnston					Fauquier	Ritchie
	Jones					Floyd	Roane
	Lee					Fluvanna	Summers
	Lenoir					Franklin	Taylor
	Lincoln					Franklin	Tucker
	Madison					Frederick	Tyler
	Martin					Fredericksburg	Upshur
	McDowell					Galax	Wayne
	Mecklenburg					Giles	Webster
	Mitchell					Gloucester	Wetzel
	Montgomery					Goochland	Wirt
	Moore					Grayson	Wood

Maryland	North Carolina	Ohio	Pennsylvania	South Carolina	Tennessee	Virginia	West Virginia
	Nash					Greene	Wyoming
	Northampton					Greensville	
	Orange					Halifax	
	Pasquotank					Hampton	
	Perquimans					Hanover	
	Person					Harrisonburg	
	Pitt					Henrico	
	Polk					Henry	
	Randolph					Highland	
	Richmond					Hopewell	
	Robeson					Isle of Wight	
	Rockingham					James City	
	Rowan					King and Queen	
	Rutherford					King George	
	Sampson					King William	
	Scotland					Lancaster	
	Stanly					Lee	
	Stokes					Lexington	
	Surry					Loudoun	
	Union					Louisa	
	Vance					Lunenburg	
	Wake					Lynchburg	
	Warren					Madison	
	Watauga					Manassas	
	Wayne					Manassas Park	
	Wilkes					Martinsville	
	Wilson					Mathews	
	Yadkin					Mecklenburg	

Maryland	North Carolina	Ohio	Pennsylvania	South Carolina	Tennessee	Virginia	West Virginia
	Yancey					Montgomery	
						Nelson	
						New Kent	
						Newport News	
						Northumberland	
						Norton	
						Nottoway	
						Orange	
						Page	
						Patrick	
						Petersburg	
						Pittsylvania	
						Portsmouth	
						Powhatan	
						Prince Edward	
						Prince George	
						Prince William	
						Pulaski	
						Radford	
						Rappahannock	
						Richmond	
						Richmond	
						Roanoke	
						Roanoke	
						Rockbridge	
						Rockingham	
						Russell	
						Salem	

Maryland	North Carolina	Ohio	Pennsylvania	South Carolina	Tennessee	Virginia	West Virginia
						Scott	
						Shenandoah	
						Smyth	
						Southampton	
						Spotsylvania	
						Stafford	
						Staunton	
						Suffolk	
						Surry	
						Sussex	
						Tazewell	
						Warren	
						Washington	
						Waynesboro	
						Westmoreland	
						Williamsburg	
						Winchester	
						Wise	
						Wythe	

Appendix C: Literature Review

1.0 Introduction

The development of a Western Virginia Intermodal Facility near the intersection of two major Norfolk Southern (NS) freight corridors (Heartland and Crescent) is a project with a complex history. As a result, there are numerous economic studies that focus specifically on the project, as well as numerous state and regional freight plans that discuss the potential facility. All project-focused studies were completed by 2008 with the selection of the Elliston site, while state and regional freight plans have been updated on a regular basis. Since the last studies for the Western Virginia Intermodal Facility were performed, economic and freight conditions have evolved, particularly in regards to the impacts of the recent economic recession, significant investment in the Crescent Corridor, opening of the Heartland Corridor, and the recent groundbreaking for the Prichard, WV intermodal facility along the Heartland Corridor. In addition, a select group of intermodal freight studies developed for other U.S. locations have been included in this review in order to provide a comprehensive perspective on the issues (and project development responses) that other similar facilities have faced.

1.1 Role of the Literature Review

The literature review will leverage the significant body of existing work on the Western Virginia Intermodal Facility, state freight and rail plans, regional freight and transportation plans completed to date, and broader intermodal literature. The review of these studies and plans will identify existing, readily available data in regards to potential users and freight volumes associated with a Western Virginia Intermodal Facility, current and forecasted freight flows in the region and Virginia, as well as issues and factors that could affect the use of the facility. In addition, the literature review is intended to identify areas where further data collection, research, or analysis will be required in later tasks of this study.

1.2 Methodology

The list of studies and plans included in the literature review was developed in coordination with the Roanoke Valley-Alleghany Regional Commission (RVARC) and the Intermodal Study Committee. The documents selected for review are shown in Table 1 and generally fell into five categories:

- **Intermodal Feasibility Studies:** These documents include prior site selection and economic impact reports for a Western Virginia regional intermodal facility, as well as the Virginia Supreme Court ruling on the constitutionality of state funding for the facility. In addition, a site feasibility and economic impact analysis for the Prichard, WV Intermodal Terminal is included due to its location along the Heartland Corridor and its proximity to the region (less than 250 miles).
- **Regional Freight Studies:** These documents include studies on regional freight diversion, trip generation, flows, freight problems and emerging needs, policies and strategies for the Roanoke Valley, New River Valley, as well as the I-81 Corridor.
- **Statewide Freight Studies:** These documents include state studies and plans for statewide multimodal freight and rail, as well as a multimodal plan for the Heartland Corridor and the Virginia state profile from the Latin America Trade and Transportation Study (LATTS).
- **Regional Economic Plans:** These documents include economic development strategies and profiles for regional organizations, including RVARC, New River Valley, and Montgomery County.
- **Regional Transportation Plans:** These documents include transportation plans with goals, policies, traffic profiles, and proposed projects near the Elliston site, including the Lafayette Route 11/460 corridor, Village Transportation Links Plan, and Montgomery County.
- **National Freight and Intermodal Facility Trends:** These documents include studies on national freight trends impacted by the Panama Canal expansion and LATTS, as well as studies on intermodal facility and inland port trends from a regional freight study in Minnesota and an inland port infrastructure analysis study for Will County, IL.

Table 1: Documents Reviewed by Type

Title	Author	Published
Intermodal Feasibility Studies		
Economic Assessment of a Roanoke Regional Intermodal Facility	HDR/HLB Decision Economics	1/7/2008
Roanoke Region Intermodal Facility Summary Report	DRPT	Mar 2008
Economic and Market Analysis for an Inland Intermodal Port	DMJM Harris/AECOM	Sep 2007
Virginia Supreme Court Ruling	Circuit Court of the City of Richmond	11/4/2011
Regional Freight Studies		
I-81 Corridor Improvement Study Freight Diversion and Forecast Report, Tier 1 Environmental Impact Statement	VDOT	2007
Freight Trip Generation for the Roanoke Valley - Technical Report	RVAMPO and RVARC	11/15/2012
Blacksburg/Christiansburg/Montgomery Area MPO Freight Study	NRVPDC	11/19/2008
Roanoke Valley - Alleghany Regional Freight Study Final Report	Wilbur Smith Associates	Jan 2003
Roanoke Valley - Alleghany Regional Freight Study Tech Memo 1: Commodity Flow Data	Wilbur Smith Associates	Aug 2002
Roanoke Valley - Alleghany Regional Freight Study Tech Memo 2: Current Freight Transportation Problems and Emerging Needs	Wilbur Smith Associates	Nov 2002
Roanoke Valley - Alleghany Regional Freight Study Tech Memo 3: Freight Policies, Strategies, and Projects	Wilbur Smith Associates	Jan 2003
Statewide Freight Studies		
Virginia Statewide Multimodal Freight Study, Phase I	Cambridge Systematics	2008
Virginia Statewide Multimodal Freight Study, Phase II	Cambridge Systematics	2010
Latin America Trade and Transportation Study: Virginia Report	Wilbur Smith Associates	Mar 2001
2013 Virginia Statewide Rail Plan	DRPT	Nov 2013
Virginia's Long-Range Multimodal Transportation Plan; Corridors of Statewide Significance: Heartland Corridor	Office of Intermodal Planning and Investment	Mar 2010
Regional Economic Plans		
Roanoke Valley - Alleghany Regional Comprehensive Economic Development Strategy	RVARC	2013
Economic Resources: Montgomery County 2025	Montgomery County	10/24/2004
Virginia's New River Valley: Comprehensive Economic Development Strategy 2013 Annual Report and 2014 Project Package	New River Valley Planning District Commission	2013
Regional Transportation Plans		
Lafayette Route 11/460 Corridor Plan	Renaissance Planning Group	3/12/2012
Village Transportation Links Plan: Final Report	Renaissance Planning Group	6/25/2007
Transportation Resources: Montgomery County 2025	Montgomery County	10/24/2004
National Freight and Intermodal Facility Trends		
LATTSII_Freight Investment Decision Principles	LATTS	2001
Panama Canal Expansion Study Phase 1 Report	US DOT Maritime Administration	Nov 2013
Northern Minnesota/Northwestern Wisconsin Regional Freight Study	Wilbur Smith Associates	Aug 2009
Will County Inland Port Infrastructure Analysis Final Report	CDM Smith	3/9/2012

2.0 Summary of Findings

The findings for each of the documentation categories are summarized in the sections that follow. The findings are discussed in terms of how they relate to the current Western Virginia Intermodal Facility Economic and Transportation Study.

2.1 Intermodal Feasibility Studies

2.1.1 Western Virginia Intermodal Facility Studies

The previous work on the feasibility of an intermodal facility in Western Virginia was concluded in 2008, and the Virginia Supreme Court ruled that the use of state funds for the facility was constitutional in 2011. These documents provide useful background information on the site selection process for the Elliston site, funding plan, as well as the assumptions used to estimate the economic impacts and public benefits based on the project definition at the time of study, including:.

- Three sites were identified as "most feasible," including the Colorado Street site, Garman Road site, and the Elliston site. They were evaluated on: Proximity and Good Truck Access to I-81; located on the Heartland Corridor Rail Line (N-Line) West of Shenandoah Connection; Avoid New Grade Separation Bridges (Especially in Congested Urban Areas); Site Acreage, Topography and Layout Suitable for Intermodal Operations; Minimize Roadway Costs and Traffic Congestion; and Efficient NS Rail and Intermodal Facility Operations. The Elliston facility had the lowest estimated costs and was the only site to have no "fatal flaw" criteria; as a result, the site has the lowest overall impact of the ten sites evaluated.
- The facility was estimated to cost between $20 and $31.8 million ($2007).These estimates do not include the additional roadway infrastructure and bridge work that was added in response to the study's findings or additional lead track that has since been added by NS.
- Warehouses were not expected to be on-site, and the facility was anticipated to serve only as a freight terminal for picking up and dropping off containers.
- The facility is to be funded with 70% DRPT Rail Enhancement funds and 30% private NS funds, as part of the Heartland Corridor investments. Additionally, NS must carry an additional 150,000 containers through the corridor after five years or repay a portion of the state's investment.
- Specific data and forecasts of freight flows or volumes are not detailed in these documents; however, the study assumes that the Elliston site would perform 15,000 lifts annually (or approximately 28,500 twenty-foot equivalent units (TEUs)) based on NS's estimate of the likely market in the Roanoke region. NS estimated that stopping two trains per day at the Elliston site would be sufficient for the first ten years. After the completion of phase II of construction, the facility would be able to handle 30,000 lifts per year.
- Operational assumptions in the analysis include:
    - The site would be owned and operated by NS and would employ approximately ten staff.
    - The site would initially operate Monday – Friday, from 7AM to 7PM.
    - It would be equipped with loaders (packers), cranes, and hostler trucks.
    - The site would also consist of storage tracks, loading pads, and parking for containers being loaded and unloaded, as well as for trucks and trailers waiting to load and unload.
- The economic impact analysis provided estimates of employment, output, and tax revenue impacts for the Roanoke region based on the range of impacts (jobs/lift) for other existing intermodal facilities. The high and low estimates for other facilities were ignored, so the range is representative of intermodal facilities that fall between Logistic-Park Chicago (27.4 jobs/lift, second lowest jobs/lift) and International Intermodal Center Huntsville (108.1 jobs/lift, second highest jobs/lift).
- The benefit cost analysis yielded a ratio of 4.0 for a 15-year period and 6.8 for a 30-year analysis period. It only considers VMT-based benefits for the entire project, including per mile values for congestion, pollution, noise, pavement maintenance, accident costs. It is important to note that the ratio includes benefits and costs for both the intermodal facility and the Heartland Corridor between the intermodal facility and Norfolk. The studies did not include a benefit cost analysis for the Roanoke intermodal facility independently.

2.1.2 Other Intermodal Facility Studies

Similarly, the Prichard Economic and Market Analysis study (2007) evaluated the site selection, potential users of an inland port, potential impacts on local roads, costs of the facility, financing options, and the economic impact of an intermodal facility in Prichard, WV. Some of the relevant data and assumptions that could be useful for the Western Virginia Intermodal Facility study as a barometer of the reasonableness of the Western Virginia inputs and findings include the following:

- Estimates of TRANSEARCH freight cargo volumes in 2005 for imports, exports, and long-distance movements for the Prichard region.
- Comparison of long-haul truck costs and rail intermodal movements using Global Insight's Intermodal Cost Analysis Model (ICAM). In one example, the total carrier cost for truck was $1,881, while it was $1,070 for rail intermodal; however, the travel time for rail was 5.0 hours longer than truck. In addition to the increased travel time, the difference in variability in travel time for the rail versus highway must be considered.
- Estimate of 45,000 annual lifts at the Prichard facility based on truck diversions.
- Economic impacts in terms of jobs, gross output, and increased economic development provided; however, details on the estimation are not transparent. The table below summarizes some key economic impacts for Prichard and compares them to the 2008 estimates for the Western Virginia Intermodal Facility.

Table 2: Comparison of Prichard and Roanoke Intermodal Facilities

	Prichard	Western Virginia Site
Acres	78 acres	65 acres
Number of Lifts	45,000 (60,000 capacity)	15,000 (30,000 capacity)
Capital Costs	$30 million to $43 million ($2007)	$26 million to $31 million ($2008)
Facility Direct Jobs	Not specified	10 to 12
Total jobs supported	700 to 1,000 by 2025	740 to 2,918 (after 15 years)

Sources: Economic and Market Analysis for an Inland Intermodal Port, 2007; Roanoke Region Intermodal Facility Summary Report, 2008

- The incremental dray cost to Roanoke from Kanawha County (where Charleston, WV is located and where most of the Prichard demand is generated) is estimated to be less than $200 more than the cost to dray to Prichard. Thus, there is little margin for user fees to pay for the West Virginia facility. The West Virginia Public Port Authority (WVPPA) will want to carefully monitor the developments for the Roanoke facility in order to protect its economic development interests and potentially its investment in the Prichard site. Now that Prichard is under construction, a similar concern that lift fees will have to be competitive due to the closeness of Prichard should be considered for the Roanoke intermodal facility.

While these studies are important informants to the current Intermodal Study, it is important to note that much of the data presented is not site specific and/or is based on conditions prior to the economic recession, completion of the Heartland Corridor, and introduction of the Crescent Corridor improvements.

2.2 Regional Freight Studies

The regional freight studies for the I-81 Corridor, RVARC, and New River Valley provide context to freight forecasts and trends produced before the economic recession and the improvements to the Heartland and Crescent Corridors. In addition, they provide details on data sources and assumptions used to develop freight forecasts that could help inform the development of new freight forecasts and diversions for the Western Virginia region as part of the Roanoke Region Intermodal Freight Facility Study.

The I-81 Corridor Tier 1 Freight Diversion and Forecast Report (2007) provided a detailed analysis of the truck movements along I-81 in Virginia using the Truck Trip Analyzer (TTA) model and the potential to move these shipments from truck to rail using the Federal Highway Administration's (FHWA) Intermodal

Transportation and Inventory Cost Model (ITIC). The TTA forecasted truck volumes at the Virginia Department of Transportation's (VDOT) permanent count station locations along I-81 translated into a compound annual growth rate of 2.8% through 2035. The freight diversion analysis was conducted based on two factors: 1) increased costs and congestion on I-81, and 2) increased rail speeds and reliability, and cost reductions. Four potential build alternatives were analyzed for rail infrastructure and rolling stock improvements, showing that up to 1.2 million annual truck trips could be diverted to rail at the highest level of investment in 2035. Improvements under the highest investment level would allow 40 mph rail speeds, a 10% improvement to transit time reliability, and an improvement of 75% load/unload times at several new intermodal terminals. Details on how the modeling was performed are included in the report and could be useful when developing the freight forecasts during Task 3.

The I-81 Corridor Freight Diversion and Forecast Report (2007) also conducted surveys of shippers/carriers to determine what goods originate or terminate along I-81, as well as the through-traffic that uses I-81 and the sensitivity of those shipments to tolls. The survey results indicated that most of the freight hauled along the I-81 corridor is classified as other manufactured products or equipment, other (generally to indicate general merchandise or mixed freight), and petroleum products. Additionally, of those surveyed almost 90% were providing long-haul trips (greater than a 50 mile radius). Approximately 23% of motor carriers indicated that they use rail as well as truck, while nearly 35% of shippers and receivers use rail.

The Blacksburg-Christiansburg-Montgomery MPO area Freight Study (2008) describes the freight volumes, directions, values, and number of loads originating in and from the New River Valley region using 2004 TRANSEARCH data. Based on this data, Montgomery County is one of leaders in the state in terms of the number of freight loads, both incoming and outgoing. Montgomery County received more loads than it exported; however the tonnage and values exported exceed those imported. Leading exported commodities by value were secondary traffic, electrical equipment, and transportation equipment. Similarly, the leading imported commodities by value were electrical equipment, transportation equipment, and clay, glass, concrete, or stone. In terms of value, most of the goods exported from the county are going to the North East and around the Great Lakes. Similarly, in terms of value, most of the goods imported to the county are coming from the North East, Southeast, Great Lakes, and portions of the Midwest. Additionally, as part of this study, a survey was distributed to local industrial companies to investigate the modes they use to ship freight. All, or 100%, use truck, and 30% use rail. The survey respondents voiced concerns over highway access, capacity, and load limits on area bridges, particularly along I-81. The intermodal facility in Western Virginia was mentioned as a way to expand freight opportunities in the region and reduce truck traffic on I-81.

The Roanoke Valley-Alleghany Regional Freight Study (2003) produced a final report as well as three technical memoranda that inform the study on historic freight flows, freight obstacles and needs, and strategies and projects for improved freight movement. Given the date of the study, most of the freight data presented is based on 1998 TRANSERACH data and VDOT highway truck flows from 1999; as a result, the study best serves as insight into past trends in the region.

- **Commodity Flows:** In 1998, truck flows moving in and out of the RVA Region exceeded 12 million tons or 79% of all tonnage; while, rail accounted for 3.4 million tons or 24% of all tonnage. In terms of value, truck moved $28.4 billion in and out of the RVA Region or 93% of all value; while, rail moved $0.9 billion or just 3% of all value.
    - Within Virginia, the region produces more than it consumes, leading to flow imbalances and potential difficulties locating backhaul shipments. Most of the intra-state flows are handled by truck. However there is some inbound rail (coal from the Bristol region) and some outbound rail to Richmond (pulp, paper, or allied products).
    - RVA truck shipments to Hampton Roads (where the Port of Virginia is located) account for 23% of the region's outbound intra-state tonnage (5.5 million tons); while, RVA shipments from Hampton Roads account for 29% of the region's inbound tonnage (3.0 million tons). Rail shipments to/from Hampton Roads are very small, totaling approximately 50 tons.

- Interstate flows to/from the study area account for 40% of all flows by weight and 43% by value for all modes. Additionally, the outbound/inbound volumes are more balanced, with 53% of tonnage inbound to the RVA region and 47% outbound. In terms of value, 45% of value is inbound while 55% is outbound, making these shipments more likely to shift to rail than the shorter, unbalanced intra-state flows.
- The largest interstate truck flows from the region are to the East North Central (Illinois, Indiana, Michigan, and Ohio) and North Carolina and largely involve chemicals or allied products, transportation equipment, and secondary traffic. Truck inbound flows also are largely from North Carolina and the East North Central and include secondary traffic for both and coal and lumber from North Carolina and clay, glass, concrete, stone, chemicals and allied products, and transportation equipment. The largest rail flows include outbound clay, concrete, glass and stone to North Carolina, food products from North Carolina, and coal, transportation equipment, and chemical products from West Virginia.
- In addition, local logistics patterns for five major commodity groups were analyzed using the Commodity Information Management System (CIMS).
  - For secondary traffic, shipments to/from warehouse and distribution facilities account for half of all shipments by value and a third of all shipments by weight in the region. The remainder includes trucks traveling back and forth between the region and the Port of Virginia. Return shipments often are sent as partial loads to consolidators located at the ports.
  - Most of the transportation equipment is shipped by truck.
  - Inbound chemical products are shipped by rail and truck; however, outbound chemical products are largely shipped by truck.
  - For pulp, paper, and allied products, the outbound shipments are almost twice the inbound. Approximately 75% of pulp and paper products enter or leave the region by truck; however, the largest single origin/destination movement is products coming inbound by rail car from Kentucky/Tennessee. The largest outbound movements in this category are to Norfolk (Hampton Roads), Richmond, and Northern Virginia, all primarily by truck. Some rail is used to Richmond, but none to Hampton Roads. For its finished products, MeadWestvaco primarily drays to intermodal facilities outside the region.
  - For clay, glass, concrete, and stone, the region ships cement and stone from its local quarries to nearby major metro areas including North Carolina, Norfolk/Hampton Roads, Washington, D.C., and Richmond. The flows are largely one-way, with limited inbound tonnages. Despite the high weights of these products, more than two-thirds of it moves outbound by truck. Rail is generally only used to North Carolina and the southeastern states (the farthest distance destinations).

- **Freight Issues and Emerging Needs:** Freight issues in the region are based on stakeholder interviews and surveys with shippers and carriers conducted as part of the RVARC 2003 study. Shippers were generally pleased with transportation services in the region; however, they did have opinions and concerns on improving the transportation system. Major concerns of shippers centered on inventory reduction and the need for increased security post 9/11. Shippers' rail/intermodal concerns focused on the poor quality of rail service in the region (slow, damage to goods); however, they also voiced their desire for an intermodal container consolidation and transfer facility in the region if service could be improved. The key factors identified for locating an intermodal facility were concentrated, balanced traffic moving over a significant distance (500 miles or more), and strong traffic in specific lanes. Discussions with NS indicated that the traffic in the region (at that time) did not necessitate the investment. MeadWestvaco (previously Westvaco) spoke with NS about the facility but no agreement was made in part because MeadWestvaco primarily has outbound freight. Additionally, it could require trackage rights with CSX or drayage to the NS site near Roanoke.

2.3 Statewide Freight Studies

The Statewide Multimodal Freight Study (Phase I and Phase 2), Long-range Multimodal Transportation Heartland Corridor Plan, Statewide Rail Plan, and the LATTS Virginia State Report provide context to the movement of current and projected freight (all modes) and truck traffic volumes in Virginia and the issues and constraints associated with its movement, including congestion, infrastructure capacity and age, and constrained funding. These studies also consider the importance of freight movement on the state economy. The freight projections are largely based on assumptions about Heartland and Crescent Corridor impacts, as the baseline freight data and forecasts were from 2004 and 2005. As a result, these studies help inform the Western Virginia Intermodal Facility Study forecasts, but do not include actual data how the Heartland and Crescent Corridors have impacted freight flows and demand in the state.

Phase 1 of the Statewide Multimodal Freight Study (2008) addresses public outreach, data collection, baseline forecasting, system inventory and analysis, and freight improvement opportunities for Virginia to develop a multimodal freight system under funding constraints. The data presented are for all modes, considering different industry sectors, origins and destinations, choke points, employment by sector, and safety concerns throughout the state. Some of the highlights of current conditions and concerns include:

- 115% and 102% growth in Virginia's truck and rail freight tonnage respectively between 2004 and 2035. With this growth comes numerous concerns and issues for the state and the movement of freight including:
    - Infrastructure condition, particularly of roadways and bridges
    - Capacity improvements and modernization for roadways, bridges, and rail infrastructure
    - Safety and emergency response
    - System performance
    - Intermodal connectivity
    - Port accessibility and service for both rail and trucks, particularly due to the bridge and access constraints to the Port of Virginia
    - Environmental impacts
    - Industry support and partnership – both in terms of trucking and rail companies as well as shippers
    - Mode shifting
    - Multistate coordination
    - Funding
- The study included a survey of freight shippers and identified congestion as the greatest concern and the desire for additional lanes on I-81. Rail capacity parallel to I-81 was insufficient, and it was noted that increasing rail capacity would reduce the need of increasing highway capacity. The survey could offer useful questions for the stakeholder workshops and/or interviews.

A follow-on to the Phase 1 report, Phase 2 (2010) identifies the freight needs for all modes in the near- and long-term as well as the individual multimodal corridors in the state and how to best alleviate the bottlenecks. The programmed improvements included in the near-term projects for all modes totaled $5.6 billion, including $1.2 billion to the Commonwealth. The Crescent Corridor Phase 1 and Heartland Corridor Phase 1 are both part of the programmed near-term projects, totaling $26.6 million and $12.7 million to the Commonwealth, respectively. The potential long-term projects for all modes totaled $14.6 billion, including approximately $6.0 billion to the Commonwealth. Phase 2 of each Corridor is included in the long-term project list.

A monetized transportation benefit analysis for the freight program investment was included and estimated the following benefits:

- By 2035, vehicle miles traveled (VMT) avoided per day was 5.1 million, amounting to discounted savings (at 3%) for the 2009-2035 period of:
    - $1.3 billion in pavement maintenance costs avoided,
    - $1.7 billion in crash-related costs avoided, and
    - $1.7 billion in emissions savings.

The Virginia Statewide Rail Plan (2013), on the other hand, focuses on the state of the Commonwealth's rail infrastructure and recommends projects for increasing the efficiency and capacity of freight and passenger operations. Some of the data highlights that impact the Roanoke Region Intermodal Freight Facility study include:

- Trucks:
  - Average daily truck traffic on I-81 for 2011 and 2040, showing that traffic is expected to double over the time period from 14,172 to 28,397 (based on FAF3.4 data)
  - Average daily truck traffic on I-64 for 2011 and 2040, showing traffic increasing by 69% over that time period from 6,969 to 11,766 (based on FAF3.4 data)
- Rail:
  - 37.0 million tons of cargo originated in Virginia in 2010, of which 3% is intermodal
  - 68.8 million tons of cargo terminated in Virginia in 2010 and intermodal was included as part of the 12% "other"
  - Mentions the planned intermodal facility in the Roanoke region
  - Port of Virginia is one of three large ports on the East Coast to provide on-dock rail access. The use of rail is a significant part of the Port of Virginia's plan to enhance the efficiency and cost effectiveness of shipping. The Port already moves a higher percentage of containers by rail than any other East Coast port, with rail volumes in 2012 reaching 30% of all cargo.
- Ports:
  - 2.11 million TEUs handled by the Port of Virginia in 2012, which was just shy of the Port's all time high of 2.12 million in 2007.
  - Port's TEU growth in containerized cargo is expected to increase by 330% between 2013 and 2040.
  - Port of Virginia plans to construct a fifth terminal—Craney Island Marine Terminal—which is scheduled to open its first phase in 2026 and second phase in 2038. This new facility, coupled with expansions and renovations at existing facilities such as NIT, will allow the Port of Virginia to accommodate over 9.5 million TEUs per year by 2038.
- Economic Development:
  - Port of Virginia estimates that over 60 million square feet of additional distribution center space will be needed over the next 25 years to keep pace with containerized exports and imports in Virginia.
  - The superior rail and highway transportation system in Virginia will allow companies access to the Port and the freedom to choose a region of the state that is most suitable in terms of workforce and real estate costs.

The rail plan provides a list of rail projects and potential funding sources within the state; as such, the Heartland Corridor double-stack project was mentioned, and truck/rail transfer facilities in the state were mapped. Some of the conditions impacting the investments include:

- Average travel times to work are higher in Virginia than most neighboring states (except Maryland) and higher than the national average.
- The rail intermodal costs compared to performance were shown to potentially be competitive with trucks in terms of performance at a lower cost.
- Over half (53%) of freight in Virginia is internal (originating and destined for Virginia) or through-traffic, while 27% is inbound and 19% is outbound.

Finally, funding recommendations for rail projects in the Six Year Improvement Program includes $36.1M for the intermodal facility in Roanoke.

The purpose of the Virginia Draft Multimodal Freight Plan (2013) is to direct investment in a way that improves connectivity, reliability, and safety in order to meet the state's strategic transportation goals and to improve Virginia's competitive economic position. It builds on the work and data from earlier studies including the Virginia Multimodal Study (Phase 1 and 2, 2008 and 2010), VTrans 2035 Update, and the Draft Statewide Rail Plan (2013). As a result, the freight challenges, issues, and data presented in this

document are similar to those presented already for these informing studies. It contains limited data on the Heartland Corridor and the Western Virginia region and is largely from the 2004/2005 period, but some key highlights and findings that help inform the Western Virginia Intermodal Facility Study include:

- Within the Heartland Corridor, 75% of the freight tonnage and 99.2% of the freight value are carried by truck.
- Most of the Heartland Corridor freight is through-traffic (71% by tonnage, 76% by value).
- Maps of the state's distribution centers that will be important for identifying potential workshop participants and users of the facility.
- The importance of freight to Virginia's economy: it supports over $350 billion of Virginia's Gross State Product annually, or about 28% of the total statewide economy. Freight-related industries also sustain 34% of jobs in Virginia.

Corridor strategies, which prioritize projects based on goals and functions, show that supporting additional freight capacity by expanding intermodal facilities focuses on freight corridors but also functions as an evacuation/link between urban centers, and serves military access, education centers, and local historic/tourism. The expanded intermodal facilities support the goals of system maintenance and preservation, mobility, connectivity, accessibility, environmental stewardship, and economic vitality. To lesser degrees, the facilities support safety and security, and even lesser the coordination of transportation and land use.

The LATTS Virginia Report (2001) examines the transportation systems in Virginia that provide service to international trade, particularly with Latin America. In addition, the study considers the impact of increased trade with Latin America on Virginia's transportation network. Using two scenarios (baseline to 2020 under normal growth, and 2020 under higher growth that results from increased liberalization of trade, higher economic growth for Latin America and/or the United States, and changes in trade policies with Cuba), the study shows that under the base growth scenario, 8.4% more highway miles will need capacity improvements, resulting in a 6.4% increase in costs to address capacity needs, and a 4.4% increase in annual pavement resurfacing costs. The high growth scenario was not estimated because the likelihood of it occurring is unknown, but would result in higher costs and needs than those numbers presented in the baseline.

The data found in the LATTS study include cargo volumes for the late 1990s and forecasts through 2020 for various cargo types. There is no mention of the Western Virginia Intermodal Facility, but volumes of intermodal cargo in Virginia were estimated for 1996 and 2020, showing a 400% increase over that time period. LATTS Corridor 3 (I-81) will be most affected by higher truck volumes. LATTS truck traffic in Virginia is expected to increase by 319% from 1997-2020.

2.4 Regional Economic Plans

The RVARC and New River Valley Comprehensive Economic Development Strategy (CEDS) plans and the Montgomery County Economic Resources 2025 Plan inform the study on the areas' demographics, income, labor force, employment, dominant industries and businesses, as well as specific community development projects. As a result, these plans provide important insight into the labor force as well as the types of industries that the region could attract with an intermodal facility.

The RVARC CEDS (2013) highlights include:

- The RVARC CEDS localities have not experienced labor force growth at the level of growth in the Commonwealth (which increased by 13.8% since 2000). The largest labor force growth in the region was experienced by Roanoke and Botetourt Counties with 6.8% and 6.6% growth, respectively since 2000.
- In 2011, several RVARC localities experienced higher unemployment levels than that of the Commonwealth (6.6%), including Alleghany County (7.9%), Craig County (7.6%), the City of Covington (8.8%), and the City of Roanoke (8.2%).

- The location quotient analysis indicates that the top industries are electrical equipment, appliance and component manufacturing, forest and wood products, glass and ceramics, and motor vehicle manufacturing. In addition, the shift share analysis shows that the region has a particular competitive advantage in medical manufacturing and research and development (R&D), and transportation equipment manufacturing.

The Montgomery County Economic Resources 2025 Plan (2004) highlights include:

- Community survey results indicated that industrial growth was important to county residents, but that they wanted it to occur in existing industrial parks or in areas that are already industrialized and away from rural parts of the county and residential areas.
- Full- and part-time jobs increased by 12.3% between 1990 and 2000, with most of the growth occurring in retail trade and services.
- The majority of business and industrial areas are located either in or in close proximity to Blacksburg and Christiansburg, or in the Virginia State Route 177 Corridor between the City of Radford and Carilion Hospital adjacent to I-81. The notable exceptions are the Elliston/Lafayette Park, located next to U.S. 460/Route 11 at Elliston, and Rowe Furniture, across the South Fork at Lafayette.

The New River Valley CEDS (2013) highlights include:

- A cluster analysis was conducted for the major industries' job creation from 2006-2011 and geographic concentration (location quotient) shows that the high growth and concentrations are the in business and financial, energy, biomedical, agricultural business, and IT telecommunications industries.
- A recommendation for the investigation of an intermodal transportation facility in Dublin was mentioned for an under-utilized army property.

2.5 Regional Transportation Plans

The Lafayette Route 11/460 Corridor Plan, Village Transportation Links Plan, and the Montgomery County Transportation Resources 2025 Plan inform the study on the local transportation goals, policies, traffic profiles, and proposed projects near the Elliston site. These documents provide background information on the transportation issues most important to the local communities and some of their concerns about the location of an intermodal facility at the Elliston site.

The Lafayette Route 11/460 Corridor Plan (2012) highlights the recommended road improvements to ensure a safe and efficient "eastern gateway" to Montgomery County, where the area's proximity to Roanoke, I-81, and flat topography make it prime space for economic development. The projects include the Route 603 (North Fork Road) – Elliston/Ironto Connector, which will provide two 12-foot travel lanes with 8-foot shoulders (5-foot paved) with retaining walls and provide a better connection between Route 11/460 and Interstate 81 at exit 128 – one of two interchanges serving the proposed intermodal facility. The plan also notes the Ellison intermodal facility site and the possible rerouting of Cove Hollow Road and the public's concern with truck traffic and the impact of flooding of Roanoke River on the rerouted Cove Hollow Road. The intermodal facility is projected to add 18 trucks per peak hour or 235 truck trips per day. To mitigate these concerns, the plan suggests that the proposed entrance to the intermodal site enter Route 11/460 at North Fork Road and that a traffic signal be installed on Route 11/460. In addition, the plan suggests alternative emergency access across the railroad tracks should flooding occur along the roadway. The plan indicates that the roadway has sufficient capacity for current traffic volumes (8,000 vehicles per day) and future growth up to 40,000 vehicles per day.

The Village Transportation Links Plan (2007) is a bike, pedestrian, and greenways planning document for the towns in Montgomery County and includes plans for Riner, Belview, Prices Fork, Plum Creek, Shawsville, Elliston, and Lafayette. Tourism is important to the local historic towns, and connections between Elliston and Lafayette are encouraged for pedestrians and bikers. There is concern over the

potential of increased traffic to the intermodal facility in Western Virginia. The study recommends that VDOT constructs pedestrian and bike facilities near the intermodal facility to offset traffic impacts.

The Montgomery County Transportation Resources 2025 Plan (2025) highlights the transportation use in the county. A survey was distributed to the community about the relative importance of four issues in the transportation system: existing roads, congestion, public transportation, and new roads. Existing roads and traffic congestion ranked as the top issues. In addition, respondents indicated that expanding public transportation as well as bikeways and trails was a primary means of reducing congestion. As the transportation facilities and economy have expanded in the county, the total daily VMT in the county has increased 266% (1975-2001), and the traffic density, defined as the average traffic per mile of road during a 24 hour period, has increased 248% in the same period of time.

2.6 National Freight and Intermodal Facility Trends

2.6.1 National Freight Trends

The LATTS II Freight Investment Decision Principles and the Panama Canal Expansion Study Phase I provide context to national freight transportation benefits and the potential impacts on U.S. freight corridors due to the opening of the Panama Canal expansion in 2015. These are important considerations that help frame Western Virginia Intermodal Facility Study benefits as well as potential impacts on the volume of freight traveling through the Port of Virginia and the Heartland Corridor.

The LATTS II briefing paper (2001) on freight investment decisions suggests that trade will increase by 85% domestically and 115% internationally through 2020, with over 80% of this growth being truck related. This growth will continue to cause pressures to existing freight networks, particularly highways that are already congested. As a result, improvements and efficiencies in freight movements will be essential in meeting this increase in demand. The paper identifies four tiers of benefits that result from improving freight transportation: 1) cost reductions to shippers (reduced transit times and increased reliability), 2) reorganization effects from improved logistics (quantity of output changes), 3) gains from additional reorganization (quality of output changes, new products), and 4) increases in regional employment and increases in regional income (not benefits quantified in a benefit cost analysis). Freight diversion from truck to rail is most likely to occur when the following criteria are met: very high volume lanes exist; hauls exceed 500-1,000 miles; and where terminals have capacity without negatively affecting throughput.

The Panama Canal Expansion Study (2013) summarizes the expansion project and its potential effects on trade for U.S ports, particularly on the East Coast. The expansion of the Canal is expected to increase the throughput of the Canal by 12 to 14 larger ships (up to 13,000 TEUS) per day, effectively doubling the volume of cargo traveling through the Canal. This is likely to result in fewer, more concentrated U.S. port calls, leading to higher peak loads that will tend to favor ports that have greater capacity in container handling, storage, and movement to inland destinations. Similarly, rail terminals may require more storage capacity to support larger volumes and higher demand peaks, and need more and higher-capacity container handling equipment to efficiently dispatch larger trains. When the Panama Canal expansion opens, the Port of Virginia will be one of four U.S. East Coast ports that will have the depth to handle the larger ships traveling through the Panama Canal. Given that the Port of Virginia already handles a significant volume of containerized cargo, it has the potential to be significantly impacted by the Canal expansion. In 2011, the Port of Virginia handled 36.9 million metric tons of cargo (10th of all U.S. ports) with a total value of $53.9 billion (8th of all U.S. ports), of which $44.6 billion was containerized (6th of all U.S. ports). The report provides summaries of total U.S. waterborne commodity imports and exports to/from Northeast Asia (the trade partner most likely impacted by the Canal expansion) for 2010 and 2040, as well as factors that affect volume growth.

Since shippers factor logistics costs, reliability, and larger market conditions into their network and distribution systems decisions, their potential responses to changing costs for ocean transportation services and their sensitivities to system performance must be better understood to properly gauge public

policy and investment decisions, which will be included in the next phase of the Panama Canal Expansion Study.

2.6.2 Intermodal Facility Trends

The Minnesota Department of Transportation's Regional Freight Study (2009) and the Will County Inland Port Infrastructure Analysis Study (2012) provide insight into intermodal terminal facility trends and issues throughout the country, including the need for a balance of freight flows, minimum lifts needed to be sustainable, additional services needed to support the facility and its users, trucking regulations and restrictions, the importance of advisory groups/stakeholder involvement, and financial agreements/arrangements between facilities and localities. These issues are important considerations for the development of the Western Virginia Intermodal Facility and determining its potential for success.

The Minnesota Department of Transportation developed a regional freight study (2009) to focus on multimodal planning in Northern Minnesota and Northwest Wisconsin. An intermodal facility was considered, but ultimately it was determined that demand was not sufficient. An imbalance between inbound and outbound traffic was noted, and is a known issue in the Roanoke region as well. However, relevant to the Roanoke facility is the range of lift capacities needed at a minimum to be sustainable: 12,000-24,000 per year. In addition, stakeholders felt that container pools, adequate parking, adjacent warehousing space, and a place to store empties were necessary at the intermodal facility. The document noted that users expect three trains per week to service the facility; otherwise they will truck or take their shipments elsewhere. Two hundred miles was considered the range for drayage distance from an intermodal facility.

Some of the relevant study recommendations on how to improve freight movements and coordination in the region included:

- Create an agreement between the port authority and the harbor commission to encourage cooperation and agreement on policies, planning activities, development, and conservation, recognizing that what benefits one benefits the other.
- Encourage participation in planning activities by stakeholders, including citizens.
- Establish a Regional Freight Advisory Committee that would provide coordinated goals and recommendations for freight in the region.
- Establish tiers of highways based on the importance of routes in the region.
- Harmonize the truck size and weight regulations to improve productivity of freight movements between states; consider reciprocity agreements and consistency among states.

The Will County Inland Port Infrastructure Analysis Study (2012) studied the need for another intermodal facility in Will County, IL, near Chicago; the county already has two. Four jurisdictions, including the county, a city, village, and the state, in addition to a private developer all have some degree of authority over the roads that lead to the two existing facilities. As a result, the inconsistencies of trucking regulations are highlighted, which is an overlapping issue with Roanoke. In addition, there is no comprehensive plan for the infrastructure's maintenance or improvements, and there is mistrust between the public and private stakeholders, again similar to the facility, NS, and Montgomery County.

The stakeholder outreach determined that a uniform process is needed for truck permitting, but balked at a Senator's recommendation that a district-wide port authority be set up. The stakeholders felt that another level of government would not be more efficient but that the current jurisdictions should work together better. However, a recommendation was to create a stakeholder group that would support the freight industry and relay truthful information to interested parties. The group would function as a mechanism to share news, resolve issues, and involve public and private entities in conversations about the freight industry. Four recommendations were listed for creating the advisory group: set clear goals, have credible leadership, pursue outcome-focused approaches, and provide two-way communication.

Finally, the report demonstrated how some municipalities have successfully entered into Annexation Agreements with developers that govern the process of integrating private property into the municipality.

Usually the process involves payments to the municipality for utilities, Tax Increment Financing (TIF) Districts, and other provisions.

3.0 Conclusions and Next Steps

Prior studies indicated that a Western Virginia Intermodal Facility was infeasible due to low volumes (Wilbur Smith, 2003) and then subsequently that a facility was beneficial to the region (HDR, 2008), though the benefits calculated did not consider a facility as an individual economic driver, but rather combined with the other elements of the greater Heartland Corridor program. Since the last Western Virginia Intermodal Facility studies were completed in 2008, the economic and freight conditions surrounding the facility have continued to evolve, painting a different context for the intermodal facility than has been studied previously. Some of the most notable changes include:

- Economic recession's impact on freight movements and NS.
- The investment in the Crescent Corridor, including the opening of new intermodal terminals in Charlotte, NC and Greencastle, PA, starting in 2008.
- The opening of the Heartland Corridor in 2010.
- Forecasted growth at the Port of Virginia associated with the expected completion of the Panama Canal expansion in 2015.
- The State of West Virginia's groundbreaking on the Prichard intermodal facility 2013 and expected opening in 2014 or 2015.
- Growing emphasis on national freight corridors with the passage of Moving Ahead for Progress in the 21st Century (MAP-21) in 2012. MAP-21 has placed a larger emphasis on improving the condition and performance of the national highway freight network and supporting investment in freight-related surface transportation projects. The Western Virginia intermodal freight facility is located along a portion of I-81 that is included in the proposed federal Priority Freight Network (PCN). As a result, the movement of highway freight is going to continue to grow in this region and along the PCN corridor. The intermodal facility could help alleviate congestion and increase capacity along the I-81 PCN in the Western Virginia region by diverting freight to rail.
- This is a comparatively small facility as designed and it would predominately serve the local export market. Low volume terminals have a harder time maintaining customers if train frequencies are below three per week, and must compete for containers as ocean carriers prefer to supply higher volume facilities. However, there is precedent for a small facility to grow and evolve, as evidenced by the Virginia Inland Port at Front Royal.
- Evolving market focus among local shippers.

Similarly, much of the data provided in the statewide and regional freight studies is based on 1998 and 2004 TRANSEARCH data, which will not account for the impacts of the economic recession and the opening of the Heartland and Crescent Corridor improvements on freight movements in the region. While these older data provide important insights into the types of commodities, origins, and destinations, the volumes and values of these flows have likely been significantly impacted by the changing economic and freight conditions. As a result, the volumes and values of freight originating, destined, and traveling through the Western Virginia region will need to be supplemented with additional volume and value data collected from 3rd party sources such as the Freight Analysis Framework (FAF3). In addition, regional economic changes and freight needs will need to be validated and updated through workshops with manufacturers, shippers, distribution centers, truckers, logistics companies, and regional economic development and planning professionals. Interviews will also be conducted with NS, CSX, the Port of Virginia, an ocean carrier, VDOT, and shippers to determine how the economic and freight conditions have impacted their business forecasts and intermodal needs in the Western Virginia region. These workshops and interviews will provide essential input into the potential use and demand for a Western Virginia Intermodal Facility.

The sections below highlight the data to be collected during Task 3 of the Western Virginia Intermodal Facility Study.

Additional Freight Volume/Tonnage and Flow Data Collection:

- **Federal Highway Administration FAF3:** tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode for 2007, the most recent year, and forecasts through 2040
    - Virginia
    - Virginia Regions (Southwestern Virginia is included in "Rest of Virginia")
- **TRANSEARCH:** Assemble data from previous studies and plans that include 1998 and 2004 TRANSEARCH data. Make sure that DRPT does not have access to more recent data.
- **PIERS:** Determine if we have access to any PIERS data through VDOT or the Port of Virginia.

Additional Interview/Workshop Data Collection:

- Local and regional shippers demand for container shipments
- What are the factors influencing your route and port selection decisions now?
- Opportunities to divert from truck to rail
- Opportunities for additional economic development and supporting industries
- Port of Virginia business needs, particularly after the Panama Canal expansion
- Railroad and ocean carrier business needs

ANNOTATED BIBLIOGRAPHY AND MATRIX

Document 1:
Economic Assessment of a Roanoke Regional Intermodal Facility Final Report, HDR|HLB Decision Economics Inc., Jan. 7, 2008

An economic analysis of a proposed intermodal facility, not specifically at Elliston, was conducted to include employment, output, and tax revenue impacts. Employment impacts ranged from 740 to 2,900; while, tax impacts were estimated to be between $18 and 71 million. The public benefits of the intermodal facility and the Heartland corridor between the intermodal facility and Norfolk were estimated in a benefit cost analysis to be 4.0 for a 15-year period and 6.8 for a 30-year analysis period. While the intermodal facility was assumed to be near Roanoke, the location was not finalized, and the economic impacts were assumed to be unaffected by the location. The facility, estimated to cost between $20 and $31.8 million, can expect 15,000 lifts of TEUs annually, and the completion of the Heartland Corridor project expects to result in 150,000 additional containers moved per year. Employment, output, and value added were estimated based on ranges that resulted from comparing other intermodal facilities. The high and low estimates were ignored, so the range is representative of intermodal facilities that fall between Logistic-Park Chicago and International Intermodal Center Huntsville.

The benefits of the Heartland Corridor and the intermodal facility are made up of economic development, production process improvements, traffic congestion reductions, environmental benefits, safety and protection, and security. The project was projected to pay for itself after five years, though the return on investment for the intermodal facility alone is not described.

Document 2:
I-81 Corridor Improvement Study Freight Diversion and Forecast Report, Tier 1 Environmental Impact Statement, Virginia Department of Transportation, 2007

The document provided a detailed analysis of the freight movements along Interstate 81 in Virginia, and the potential to move these shipments from truck to rail. Surveys of shippers/carriers and truck through-traffic were conducted to determine what goods originate or terminate along I-81, as well as the through-traffic that uses I-81, and the sensitivity of those shipments to tolls. Forecasts for 2035 truck movements were developed in the Truck Trip Analyzer (TTA) model based on existing traffic counts. Summaries of the data inputs and assumptions were included in all sections of the analysis, as well as sources of publicly available data. Forecasts for 2035 were developed based on Freight Analysis Framework (FAF) and truck forecasts from the VDOT.

The freight diversion analysis was conducted based on two factors: 1) increased costs and congestion on I-81, and 2) increased rail speeds and reliability and cost reductions. A critical point from surveys and prior studies found that diversions to rail are limited by a lack of infrastructure in Virginia to accommodate increased rail traffic. Four potential rail build alternatives were analyzed for rail infrastructure and rolling stock improvements, showing that up to 1.2 million truck trips could be diverted to rail at the highest level of investment in 2035.

Document 3:
Roanoke Region Intermodal Facility Summary Report, DRPT, March 2008.

The document presents the case for locating an intermodal facility in the Roanoke Region. In light of the Heartland Corridor investment and highway congestion, the study finds that the facility is easily needed as of 2008. The economic impacts of the Roanoke facility cite the results found in Document 1. In addition, the site selection process is detailed in terms of three phases of screening factors for ten sites in the Roanoke area. Three sites made it to the third phase of screening, with the Elliston facility having the lowest estimated costs and no "fatal flaw" criteria; as a result, the site has the lowest overall impact.

Document 4:
Economic and Market Analysis for an Inland Intermodal Port, DMJM Harris|AECOM, September 2007.

The document investigates whether the Prichard Intermodal Facility is in the right location and what impacts it will have on West Virginia. The study analyzed the opportunities for and users of an inland port, evaluated the Prichard site compared to other sites and its impact on local roads, estimated operating and capital costs, considered financing options available for the facility, confirmed the long-term impacts of the facility for the state, and estimated the economic impact of the facility. The economic impact of the Prichard facility was estimated in terms of jobs, gross output, and increased economic development. The study concluded that the West Virginia market can support the terminal through the diversion of truck traffic to rail, and the impacts to the highway system are modest. While the economic returns are moderate for the state, there is potential for warehousing to develop near the facility. Competition with the Roanoke facility was noted as a concern.

Document 5:
Roanoke Valley - Alleghany Regional Comprehensive Economic Development Strategy, Roanoke Valley-Alleghany Regional Commission, 2013.

The document outlines the region's comprehensive economic development strategy, identifying local demographics including population, gross metropolitan product, income, labor force, unemployment, number of business establishments, enplanements, housing sales, and occupancy rates. In addition, location quotient and shift share analyses are included. The location quotient shows the top industries are electrical equipment, appliance and component manufacturing, forest and wood products, glass and ceramics, and motor vehicle manufacturing. The shift share analysis demonstrates that the region has a particular competitive advantage in medical manufacturing and R&D and transportation equipment manufacturing.

Finally, the project prioritization methodology describes how the commission selects economic and community development projects. Projects are judged on ten criterion on a 100 point scale, and a priority list of the short-term projects are shown with possible funding sources that are being actively pursued, while the rest are presented in a long-term list.

Document 6:
Freight Trip Generation for the Roanoke Valley - Technical Report, RVAMPO and RVARC, November 15, 2012.

The study had two purposes: to investigate the volume of freight in the Roanoke Metropolitan Planning Organization area based on the number of employees to generate a freight profile for the region, and to analyze those results at the Transportation Analysis Zone (TAZ) level in terms of other transportation planning factors. Data were collected through interviews as well as survey instruments distributed to business that generate freight as part of their normal operation (not necessarily logistics or trucking organizations). In total, the study received 57 responses, though many were partially complete. The regression analysis was statistically insignificant for a number of iterations, but found that annual freight value per employee was statistically significant for both inbound and outbound freight. It showed that outbound freight increases faster with greater employment, inbound truck weight increases faster with employment than outbound truck weight, and annual volume per employee is greater for outbound freight than inbound, though neither was statistically significant.

Document 7a:
Virginia Statewide Multimodal Freight Study, Phase I, Cambridge Systematics, 2008

Phase I of the study addresses public outreach, data collection (largely from 2004 TRANSEARCH data), baseline forecasting, system inventory and analysis, and freight improvement opportunities for Virginia to develop a multimodal freight system with funding constraints. The data presented are for all modes (truck, rail, port, and air) and include different industry sectors, origins and destinations, choke points, employment by sector, and safety concerns throughout the state. The study includes a survey of freight shippers that identified congestion as the greatest concern and a significant desire for additional lanes on I-81. Rail capacity parallel to I-81 was described as insufficient, and it was noted that increasing rail capacity would reduce the need of increasing highway capacity. The survey could offer useful questions for the stakeholder workshops and/or interviews.

Document 7b:
Virginia Statewide Multimodal Freight Study, Phase II, Cambridge Systematics, 2010

A follow-on to the Phase I report, Phase II identifies the freight needs for all modes in the near- and long-term, individual multimodal corridors in the state, and the Roanoke sub region. The multimodal corridors of particular interest for the Roanoke Regional Intermodal Freight Facility Study include I-77, I-81, U.S. 220, and U.S. 460. The Crescent Corridor Phase I and Heartland Corridor Phase I are both part of the programmed near-term projects, totaling $26.6 million and $12.7 million for the Commonwealth. Phase II of each Corridor is included in the long-term project list, which includes enhancement for Virginia's terminals (including Elliston). A monetized transportation benefit analysis is included and estimates the VMT avoided to be 5.1 million per day, amounting to pavement maintenance costs avoided, crash-related costs avoided, and emissions savings. The Roanoke intermodal facility under development is noted as alleviating truck traffic from the highways, particularly as 70% of the traffic in the region is trucks.

Document 8:
Emerging Principles in Freight Investment Decision, Latin America Trade and Transportation Study (LATTS) II, 2001

The brief document describes how trade will increase by 115% internationally through 2020, causing pressures to existing freight networks. As a result, improving freight transportation is a key component to successfully accommodating this growth. The document identifies four tiers of benefits that result from improving freight transportation, including 1) cost reductions to shippers (reduced transit times and increased reliability), 2) reorganization effects from improved logistics (quantity of output changes), 3) gains from additional reorganization (quality of output changes, new products), and 4) increases in regional employment and increases in regional income (not benefits quantified in a Benefit Cost Analysis). The document states that freight diversion from truck to rail is most likely to occur when the following criteria are met: very high volume lanes exist; hauls exceed 500-1,000 miles; and where terminals have capacity without negatively affecting throughput.

Document 9:
Blacksburg/Christiansburg/Montgomery Area Metropolitan Planning Organization Freight Study, NRVPDC, November 19, 2008

The document describes the freight volumes, directions, values, and number of loads originating in and from the New River Valley region using 2004 TRANSEARCH data. A survey, not included with the document, was distributed to local industrial companies to investigate the modes they use to ship freight. All, or 100%, use truck, and 30% use rail, and they voiced concern over highway access, capacity, and load limits on area bridges, particularly along I-81. Respondents also noted that air cargo facilities are lacking. The intermodal facility at Elliston was mentioned as a way to expand freight opportunities in the region and reduce truck traffic on I-81.

Document 10:
Roanoke Valley - Alleghany Regional Freight Study Final Report, Wilbur Smith Associates, January 2003

The study includes commodity data for truck, rail, and air cargoes by inbound, outbound, and intrastate for Virginia and the Roanoke region, primarily using 1998 TRANSEARCH data and VDOT highway truck flows from 1999. In addition, a summary of freight issues in the region is presented based on stakeholder interviews and surveys. Concerns and issues are broken-down by shippers for highway and rail, motor carriers, and other entities such as the Virginia Inland Port, Port of Virginia, NS, CSX International, Triple Crown Services, and TA Travel Centers. Shippers voiced their desire for an intermodal container transfer facility in the region. VDOT has identified six criteria for establishing an intermodal facility: 1) a large seaport, 2) a large population providing a consumer base, 3) large manufacturing or distribution traffic base, 4) distance of over 500 miles between origin and destination, 5) minimum of 25,000 shipments annually to and from three or fewer other market areas (BEAs) which are relatively close to each other, and 6) generally balanced volumes (return trips). At the time, it was determined that traffic did not necessitate the investment, and NS agreed. Westvaco (now MeadWestvaco), a company that uses containers, spoke with NS about the facility but no agreement was made in part because Westvaco primarily has outbound freight, and it could involve trackage rights with CSX or drayage to the NS site near Roanoke.

Finally, goals and strategies to enhance freight mobility in the state were discussed, including: considering trucks in traffic geometry; use ITS to help with freight operations; monitor freight data to measure distance, time sensitivity, links between points, and peak travel times; partnerships for planning; and get advice from committees and forums. The ten projects, mostly intersection improvements and merges, which could be included in the region's Transportation Improvement Program, are listed.

Document 11:
Roanoke Valley - Alleghany Regional Freight Study Technical Memorandum #1: Commodity Flow Data, Wilbur Smith Associates, August 2002

The document includes commodity flow data by mode, direction, value, weight, and industry in the region. The data are based on the 1998 Virginia TRANSEARCH Database from Reebie Associates. Data for air freight came from the federal Office of Airline Statistics Form 41 Reports, airport-to-airport flows from the Bureau of Transportation Statistics, and the Commodity Flow Survey. Also referenced is the Virginia Department of Transportation highway truck flows survey from 1999 for the Roanoke area. The survey took counts of vehicle types and direction to see the proportion of traffic going north and southbound on routes around Roanoke, and results indicate that a high volume of truck traffic is through traffic on I-81.

Document 12:
Roanoke Valley - Alleghany Regional Freight Study Tech Memo 2: Current Freight Transportation Problems and Emerging Needs, Wilbur Smith Associates, November 2002

The second technical memorandum for the Roanoke Valley-Alleghany Regional Freight Study focused on the current freight patterns, problems, and anticipated needs in the region. The data included in the document were from 1998 Virginia TRANSEARCH database and were broken-down by the top major commodities to show volumes (tons), primary movements, origins and destinations, and values. In addition, the document included interview results from shippers and motor carriers as well as a summary of a freight forum held to interview and survey shippers, receivers, carriers, and other freight stakeholders. One major takeaway from the freight forum was that improved access to the Hampton Roads area would be an important economic driver for the region. However, the technical memorandum noted that NS indicated that the region currently does not have the traffic levels needed to necessitate an intermodal facility.

Document 13:
Roanoke Valley - Alleghany Regional Freight Study Tech Memo 3: Freight Policies, Strategies, and Projects, Wilbur Smith Associates, January 2003

The third and final technical memorandum of the Roanoke Valley-Alleghany Regional Freight Study analyzed the issues facing the freight industry and suggested methods to obtain a more efficient freight network in the state, including enhanced freight mobility, urban design and growth management policy, promoting economic vitality and quality of life, and project programming and funding. There was no data analysis conducted in this technical memorandum, as it was more focused on planning. The proposed intermodal facility in Roanoke was briefly discussed as a possibility that has been monitored for a number of years, but at the time of writing NS indicated that the region has too much outgoing containerized freight and not enough incoming. The unbalanced flows were thought to be the greatest obstacle to the facility's feasibility.

Finally, ten projects were described that could be included in the state's Transportation Improvement Program (TIP), including improved signage, intersection and lane configuration improvements, and signal changes.

Document 14:
Panama Canal Expansion Study Phase 1 Report, United States Department of Transportation Maritime Administration, November 2013

The document summarizes the Panama Canal expansion project and its potential effects on trade for U.S. ports, particularly on the East Coast. The expansion of the canal is expected to increase the throughput of the Canal by 12 to 14 larger ships (up to 13,000 TEUS) per day, effectively doubling the volume of cargo traveling through the Canal. This is likely to result in fewer, more concentrated U.S. port calls, leading to higher peak loads that will tend to favor ports that have greater capacity in container handling, storage and movement to inland destinations. To meet the needs of larger ships, port infrastructure improvements will be needed, including cranes, storage, processing abilities, and intermodal terminals. Similarly, rail terminals may require more storage capacity to support larger volumes and higher demand peaks, and need more and higher-capacity container handling equipment to efficiently dispatch larger trains. The report provides summaries of total U.S. waterborne commodity imports and exports to/from Northeast Asia (the trade partner most likely impacted by the Canal expansion) for 2010 and 2040, as well as factors that affect volume growth.

Document 15:
Lafayette Route 11/460 Corridor Plan, Renaissance Planning Group, 2012

The document is a planning study for Route 11/460 in eastern Montgomery County. Improvements to the study area are recommended to ensure a safe and efficient "eastern gateway" to the county. The area's proximity to Roanoke, I-81, and its flat topography make it a prime location for economic development. The document notes the Ellison site and projects that the intermodal facility will add 18 trucks per peak hour, or 235 truck trips per day by 2020. The Corridor Plan also documents the public's concern with truck

traffic and possible rerouting of a nearby road and the potential for its flooding by the Roanoke River. There are traffic counts included in the document, as well as study area maps showing areas of concern such as non-signalized intersections and a nearby elementary school.

Document 16:
Village Transportation Links Plan: Final Report, Renaissance Planning Group, 2007

The document is a bike, pedestrian, and greenways planning document for the towns in Montgomery County and includes plans for Riner, Belview, Prices Fork, Plum Creek, Shawsville, Elliston, and Lafayette. Tourism is important to the local historic towns, and connections between Elliston and Lafayette are encouraged for pedestrians and bikers. There is concern over the potential of increased traffic due to the intermodal facility in Elliston. The study recommends that VDOT construct pedestrian and bike facilities near the intermodal facility to help offset traffic impacts.

Document 17a:
Economic Resources: Montgomery County 2025, Montgomery County, 2004

This economic planning document outlines the economic goals for the county including land use and quality of life indicators and benchmarking, workforce development and training, location of economic resources and the quality of development, and developing and attracting economic resources. Commuting patterns are briefly mentioned and mapped, and lists of top manufacturing firms and business parks in the county are included. Employment data by sector and income tabulations were included and compared to other Virginia counties.

Document 17b:
Transportation Resources: Montgomery County 2025, Montgomery County, 2004

This brief transportation planning document shows the land use, highway, mass transit, and alternative transportation resources in the county. A survey was distributed to the community about the relative importance of four issues in the transportation system: existing roads, congestion, public transportation, and new roads. Existing roads and traffic congestion ranked as the top issues. In addition, respondents indicated that expanding public transportation as well as bikeways and trails was a primary means of reducing congestion. As the transportation facilities and economy have expanded in the county, the total daily vehicle miles traveled in the county has increased 266% (1975-2001), and the traffic density, defined as the average traffic per mile of road during a 24 hour period, has increased 248% in the same period of time.

Document 18:
Virginia Supreme Court Ruling, Circuit Court of the City of Richmond, November 4, 2011

This document is the final court ruling on the Elliston intermodal facility lawsuit filed by Montgomery County against the Virginia Department of Rail and Public Transportation (DRPT). The county alleged that DRPT could not fund the project because they are only to fund road projects, and additionally that the financial agreement made between NS and DRPT was unconstitutional because the county believed DRPT was extending a line of credit to NS. The court ruled that the funding was a grant, and not a line of credit, and that expanding rail capacity thereby increases highway capacity and is thus considered a road project. The result of the ruling was that the intermodal facility in Elliston could continue to move forward. The intermodal facility is to be paid for by the Rail Enhancement Fund, which requires at least 30% private funding. As a result, the funding plan for the intermodal facility is 70% state and 30% NS. In addition, NS must move an additional 150,000 through the Heartland Corridor after five years or they must pay back some of the funding provided by the state.

Document 19:
Latin America Trade and Transportation Study: Virginia Report, Wilbur Smith Associates, March 2001

This document considers maritime, airport, railroads, and highways. The report considers two forecast scenarios: 1) Baseline to 2020 under normal growth, and 2) 2020 under higher growth that results from increased liberalization of trade, higher economic growth for Latin America and/or the United States, and changes in trade policies with Cuba. The baseline forecast analysis shows that 8.4% more highway miles will need capacity improvements, resulting in a 6.4% increase in costs to address capacity needs and a 4.4% increase in annual pavement resurfacing costs. The high growth scenario was not estimated because the likelihood of it occurring is unknown, but would result in higher costs and needs than those numbers presented in the baseline.

The data found in the document include cargo volumes for the late 1990s and forecasts through 2020 for various cargo types. There is no mention of the Roanoke Intermodal facility, but volumes of intermodal cargo in Virginia were estimated for 1996 and 2020, showing a 400% increase over that time period. LATTS Corridor 3 (I-81) will be most affected by higher truck volumes. LATTS truck traffic in Virginia is expected to increase by 319% from 1997-2020.

Document 20:
2013 Virginia Statewide Rail Plan, Virginia Department of Rail and Public Transportation, November 2013

The document focuses on the state of the Commonwealth's rail infrastructure and recommends projects for increasing efficiency and capacity of freight and passenger operations. The report includes daily truck traffic on I-81 for 2011 and 2040, showing that traffic is expected to double over the time period. Other data included are track mileage by railroad class in the state, tons of rail cargo originating and terminating in Virginia for 2010, and the forecasted increase in containerized cargo at the Virginia ports from 2013-2040.

The document provides a list of rail projects and potential funding sources within the state; as such, the Heartland Corridor double-stack project was mentioned and truck/rail transfer facilities in the state were mapped. The average travel times to work are higher in Virginia than most neighboring states (except Maryland) and higher than the national average. The rail intermodal costs compared to performance were shown to potentially be competitive with trucks in terms of performance at a lower cost. Over half (53%) of freight in Virginia is internal (originating and destined for Virginia) or through-traffic, while 27% is inbound and 19% is outbound. Finally, funding recommendations for rail projects in the Six Year Improvement Program includes $36.1M for the intermodal facility in Roanoke.

Document 21:
Virginia's Long-Range Multimodal Transportation Plan: Corridors of Statewide Significance: Heartland Corridor, Office of Intermodal Planning and Investment, March 2010

This planning document contains limited data on the Heartland Corridor, including the total freight tonnage by value and mode, which shows 75% of the tonnage and 99.2% of the value are carried by truck along the corridor. The report contains a number of maps, including the state's distribution centers. Freight tonnage and value by direction demonstrates that most freight is through-traffic (71% by tonnage, 76% by value) on the Heartland Corridor. Population projections of local jurisdictions and universities were included. The proposed intermodal facility near Roanoke is briefly mentioned.

Corridor strategies, which prioritize projects based on goals and functions, show that supporting increased freight capacity by expanding intermodal facilities focuses on freight corridors but also functions as an evacuation/link between urban centers and serves military access, education centers, and local historic/tourism. The expanded intermodal facilities support the goals of system maintenance and preservation, mobility, connectivity, accessibility, environmental stewardship, and economic vitality. To lesser degrees, the facilities support safety and security, and even lesser the coordination of transportation and land use.

Document 22:
Virginia's New River Valley: Comprehensive Economic Development Strategy 2013 Annual Report and 2014 Project Package, New River Valley Planning District Commission, 2013

This local planning document lists the priorities and objectives for the region, the projects for 2013 and 2014 that meet these goals, and the funding levels needed. A cluster analysis was conducted for the major industries' job creation from 2006-2011, and the location quotient analysis shows that the high growth and concentrations are in the business and financial, energy, biomedical, agricultural business, and IT telecommunications industries. A recommendation for the investigation of an intermodal transportation facility in Dublin was mentioned for an under-utilized army property.

Document 23:
Intermodal and the Roanoke Region: What the new intermodal facility means for economic development, Roanoke Regional Partnership, April 1, 2009

This report introduces the important role economic developers have in the potential regional economic impact associated with intermodal facilities. It provides case studies of other intermodal and freight transportation facilities' development and marketing strategies, including the Virginia Inland Port, the Port of Huntsville, Alliance Intermodal in Fort Worth, TX, Rickenbacker, KC Smart Port, and the Joliet Arsenal. The case studies help demonstrate that the communities and economic development organizations play an important role in attracting new businesses to an area. The most successful intermodal case studies relied on a strong partnership between the intermodal-related transportation industry, the private sector, and the public sector and a combined vision and marketing strategy. The marketing strategy must not only raise awareness of the intermodal facility to existing businesses in and around the region, it must also address potential competition. The report highlights that this is especially important for the Roanoke region because not only will communities surrounding the intermodal facility be vying for new business, but there are other intermodal facilities planned for the Heartland Corridor, including Prichard, WV.

Document 24:
Virginia Multimodal Freight Plan (Draft Report), Cambridge Systematics, Inc. for the Office of Intermodal Planning and Investment, November 2013

This document builds off of recent state freight planning efforts, particularly the Virginia Statewide Multimodal Freight Study. The Virginia Multimodal Freight Plan (Freight Plan) is designed to guide freight policy, program, and investment decisions in the Commonwealth by preserving and enhancing goods movement on its highways, railways, ports, and airports. The Freight Plan summarizes Virginia's freight trends and issues; highlight's the state's recent freight transportation planning efforts; demonstrates how the plan meets federal MAP-21 guidelines for state freight plans; describes the relationship between Virginia's transportation goals and freight-specific investment priorities and investment strategies; identifies key performance measures for the investment strategies, investment priorities, and the overall system-wide goals; summarizes outreach efforts with public agencies and freight stakeholders as part of the plan development; describes the state's freight corridors; and identifies freight transportation needs. All of the data in the report are based on the data collected and analyzed as part of the Virginia Statewide Multimodal Freight Study (see Documents 7a and 7b).

Document 25:
Northern Minnesota/Northwestern Wisconsin Regional Freight Study, Wilbur Smith Associates for the Minnesota Department of Transportation, August 2009

This study focused on multimodal planning in Northern Minnesota and Northwest Wisconsin. An intermodal facility was considered, but ultimately it was determined that demand was not sufficient. An imbalance between inbound and outbound traffic was noted, and is a known issue in the Roanoke region as well. However, relevant to the Roanoke facility is the range of lift capacities needed at a minimum to be sustainable: 12,000-24,000 per year. In addition, stakeholders felt that container pools, adequate parking,

adjacent warehousing space, and a place to store empties were necessary at the intermodal facility. The document noted that users expect three trains per week to service the facility; otherwise they will truck or take their shipments elsewhere. Two hundred miles was considered the range for drayage distance from an intermodal facility.

Some of the relevant study recommendations on how to improve freight movements and coordination in the region include:

- Create an agreement between the port authority and the harbor commission to encourage cooperation and agreement on policies, planning activities, development, and conservation, recognizing that what benefits one benefits the other.
- Encourage participation in planning activities by stakeholders, including citizens.
- Establish a Regional Freight Advisory Committee that would provide coordinated goals and recommendations for freight in the region.
- Establish tiers of highways based on the importance of routes in the region.
- Harmonize the truck size and weight regulations to improve productivity of freight movements between states; consider reciprocity agreements and consistency among states.

Document 26:
Will County Inland Port Infrastructure Analysis, CDM Smith, March 9, 2012

This document studied the need for another intermodal facility in Will County, IL, near Chicago; the county already has two. Four jurisdictions, including the county, a city, village, and the state, in addition to a private developer all have some degree of authority over the roads that lead to the two existing facilities. As a result, the inconsistencies of trucking regulations are highlighted, which is an overlapping issue with Roanoke. In addition, there is no comprehensive plan for the infrastructure's maintenance or improvements, and there is mistrust between the public and private stakeholders, again similar to the facility, NS, and Montgomery County.

The stakeholder outreach determined that a uniform process is needed for truck permitting, but balked at a Senator's recommendation that a district-wide port authority be set up. The stakeholders felt that another level of government would not be more efficient but that the current jurisdictions should work together better. However, a recommendation was to create a stakeholder group that would support the freight industry and relay truthful information to interested parties. The group would function as a mechanism to share news, resolve issues, and involve public and private entities in conversations about the freight industry. Four recommendations were listed for creating the advisory group: set clear goals, have credible leadership, pursue outcome-focused approaches, and provide two-way communication.

Finally, the report demonstrated how some municipalities have successfully entered into Annexation Agreements with developers that govern the process of integrating private property into the municipality. Usually the process involves payments to the municipality for utilities, Tax Increment Financing (TIF) Districts, and other provisions.

Table 3: Documents Reviewed Matrix

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
1	Economic Assessment of a Roanoke Regional Intermodal Facility	HDR/HLB Decision Economics	1/7/2008	Intermodal Feasibility Study	15,000 annual lifts/28,500 TEUs assumed; Employment to increase by 740-2,900 jobs; Tax revenues estimated at $18-71 million; Investment would be paid back in five years (20% annual return); Estimates construction costs of $26 million	No data included, not site-specific (used assumptions based on other intermodal facilities); unclear if the facility would have BCA >1 without the Heartland Corridor improvements	Benefit-Cost at 15- and 30-year intervals and economic impact; Estimates economic development, production process improvements, traffic congestion, environment, safety and protection, and security improvements; Used IMPLAN 2004, a 4% discount rate, and 2007 dollars	BCA, economic impacts, comparison of facilities and functions
2	I-81 Corridor Improvement Study Freight Diversion and Forecast Report, Tier 1 Environmental Impact Statement	VDOT	2007	Regional Freight Study	Segments of I-81 truck volumes and growth forecasts (existing and forecasted 2035) and average annual growth rates; Origin/destination pairs for survey recipients; Traffic station counts in 2002 and 2035; Truck to rail diversion tables for No Build and four Build Alternatives; inputs to the ITIC Model; Detailed survey results on truck movements and volumes in VA	Four Build rail scenarios, including significant rail speed improvements; however, does not deal with intermodal facility specifically; appears ITIC is still available from FHWA, though it is unclear when it was last updated	Truck Trip Analyzer (TTA) used, as well as Freight Analysis Framework (FAF); 147,000 truck trips diverted on the low end (concept 1) to 1,224,500 truck trips on the high end (concept 4) annually in 2035; Includes the freight movement survey questions; Freight diversion analysis used the Intermodal Transportation and Inventory Cost Model (ITIC) developed by FHWA Office of Policy & FRA	Freight forecasting
3	Roanoke Region Intermodal Facility Summary Report	DRPT	Mar 2008	Intermodal Feasibility Study	87 estimated trucks per day (NS) in 2015 and up to 235 by 2020, which translates into 15,000 annual lifts; Site selection criteria for the Elliston site	Unclear how the truck diversions and annual lifts were determined	Preliminary screening of ten potential intermodal sites; economic estimation of benefits of a facility in the Roanoke Region; project costs; final site recommendation	Economic impact, freight forecasting (additional truck assumptions), and market scenarios that could affect site selection
4	Economic and Market Analysis for an Inland Intermodal Port	DMJM Harris/AECOM	Sep 2007	Intermodal Feasibility Study (Prichard, WV)	Estimated freight cargo volumes in 2005 for imports, exports, long-distance movements based on TRANSEARCH data; Comparison of long-haul truck costs and rail intermodal movements using Global Insight's ICAM Freight Locator data; Economic growth by county 2005-2015, 2015-2025; Employment and industry growth by county; Intermodal Freight Visual Database sources listing; Cost estimate breakdown.	A 100-mile catchment area was used. ROI/BCA elements not clear.	Possible funding options compared. Sustainability analysis. BCA shows return of 1.6 to 2.3 times the capital investment when considering GDP and logistics cost reductions. Cost of construction estimated at $30M.	Freight forecasting, BCA and economic impact analysis, facility needs and size

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
5	Roanoke Valley - Alleghany Regional Comprehensive Economic Development Strategy	RVARC	2013	Regional Economic Plan	County population; GDP; Unemployment; Establishments; Airport enplanements; Housing statistics; Largest employers; Location quotient; Shift-share; Per capita income by county; Prioritization of projects		Location quotient; Shift-share; Visions and goals; prioritization projects	Workshop attendees; economic profile of the Roanoke Region
6	Freight Trip Generation for the Roanoke Valley - Technical Report	RVAMPO and RVARC	11/15/2012	Regional Freight Study	Freight generation profile; Freight trip generation per square footage by industry	Many regression cases were statistically insignificant	Regression analysis of freight value and weight per employee, truck weights per employee, shipments vs. employees.	Freight survey; Freight forecasting
7a	Virginia Statewide Multimodal Freight Study, Phase I	Cambridge Systematics	2008	Statewide Freight Study (includes Truck, Rail, Port, and Airport)	2004 TRANSEARCH database supplemented with international waterborne data; Detailed graphics of modes, tonnages, industries, and direction of travel; Employment by sector; Origins and destinations; Safety incidents and locations; Bottlenecks for all modes; Truck AADT	2004 TRANSEARCH data is prior to economic recession and opening of Heartland and Crescent Corridor improvements	Survey results presented with congestion as the biggest freight problem in the state; Stakeholders want added highway capacity and more lanes on I-81; Identified insufficient rail capacity parallel to I-81 and that addressing this could reduce the need to widen I-81	Freight forecasting; Distribution center square footages; Workshop questions
7b	Virginia Statewide Multimodal Freight Study, Phase II	Cambridge Systematics	2010	Statewide Freight Study (includes statewide multimodal corridors, including the Roanoke Region)	Benefits estimated on 5.1 million VMT avoided daily in 2035; Impacts estimated include emissions, safety, travel time, vehicle operating costs, maintenance, and shipper costs; Jobs, labor income generated, and output created also estimated; Commodities/volumes and facility inventories detailed for the 11 multimodal corridors in Virginia	Only applies pavement, crash, and emissions benefits; Documentation unclear on how 5.1 million VMT are avoided daily	Multimodal corridor analysis and identification of projects that would alleviate bottlenecks in each corridor; In the I-81 corridor it recommends the Crescent Corridor be completed and widening of I-81 in select locations; Recommendations to widen U.S. 460 as well; Brief benefit cost and economic benefits were estimated using DRPT benefit cost evaluation tool based on 5.1 million VMT avoided daily in 2035; Benefits include pavement, safety, emissions, shipper cost savings, multiplier benefits from shipper savings, and value of time savings; It appears that many of the BCA factors are from the Cambridge BCA of the NS Crescent Corridor proposal	Freight forecasting; Benefit cost analysis (Table 1.6); Economic benefits (Table 1.7); Profiles for Roanoke sub region, I-77, I-81, U.S. 220, and U.S. 460

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
8	LATTSII_Freight Investment Decision Principles	LATTS	2001	National Freight and Intermodal Facility Trends	International trade will increase by 115% through 2020. Vehicle operating costs are estimated as 43.4 cents per mile for trucks.	No supporting data included	Describes four tiers of benefits come from improved freight transportation: cost reductions to shippers (reduced transit times and increased reliability), reorganization effects from improved logistics (quantity of output changes), gains from additional reorganization (quality of output changes, new products), increases in regional employment and increases in regional income (not benefits in BCA); Freight diversion from truck to rail most likely when: very high volume lanes exist, hauls exceed 500-1,000 miles, where terminals have capacity without negatively affecting throughput	BCA
9	Blacksburg/Christiansburg/Montgomery Area MPO Freight Study	NRVPDC	11/19/2008	Regional Freight Study	2004 TRANSEARCH data; Commodity shipments in the region (loads, value, weight) originating in and destined to Montgomery County; Volume of freight on rails; Surveyed companies expected growth in freight	Survey data not included	Survey was distributed and completed by 17 companies in the New River Valley Region. Of the respondents, 100% use truck and 30% use rail and/or air. Most traffic flowed along I-81 and concerns about access, capacity, and load limits on area bridges were voiced. Elliston intermodal facility mentioned as an opportunity to remove trucks from I-81 and accommodate growing freight industries in the region.	Workshop participants
10	Roanoke Valley - Alleghany Regional Freight Study Final Report	Wilbur Smith Associates	Jan 2003	Regional Freight Study	1998 TRANSEARCH data, Commodity shipments in the region (loads, value, weight) originating in and destined to the region		Surveys and interviews of freight users in the region; List of interviewees	Interviewees, Westvaco

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
11	Roanoke Valley - Alleghany Regional Freight Study Tech Memo 1: Commodity Flow Data	Wilbur Smith Associates	Aug 2002	Regional Freight Study	1998 TRANSEARCH data: flows by mode, flows by commodity, interstate/intrastate freight flows, RVA county level summaries; Local highway flows based on a VDOT OD study	The data are from 1998, so likely very outdated. TRANSEARCH rail and air movements have high degrees of summation to avoid presenting proprietary information, and a large proportion of high value traffic is reported under "miscellaneous mixed shipment" categories.	Truck tonnage to/from the region is higher than the national average (80% vs. 69%)	Freight forecasting
12	Roanoke Valley - Alleghany Regional Freight Study Tech Memo 2: Current Freight Transportation Problems and Emerging Needs	Wilbur Smith Associates	Nov 2002	Regional Freight Study	1998 TRANSEARCH data; Top commodities by tonnage and value; Tonnage O-D maps by commodity; Potential for an intermodal facility	Same as Document 11	Location quotients for main industries; Stakeholder interviews and surveys of shippers, carriers, freight operators, and municipal providers; Interview and survey questions included in document; Found that the region does not have the traffic levels needed to necessitate the intermodal facility; A very small portion of the long-haul trucks in and out of Roanoke are considered divertible	Interviews and workshops; Market scenarios
13	Roanoke Valley - Alleghany Regional Freight Study Tech Memo 3: Freight Policies, Strategies, and Projects	Wilbur Smith Associates	Jan 2003	Regional Freight Study	No data specifically included in the study, but mentions that freight needs should be monitored through data analysis	An intermodal facility in Roanoke is mentioned, but the lack of two-way traffic is the greatest obstacle - container traffic moves out of the region but not into it. RoadRailer is mentioned as an option to investigate.	Defines freight goals and proposes ten projects that could be included in the Transportation Improvement Program for the region; Recommends investing in roadway projects that connect to intermodal facilities because they are known bottlenecks, and to design roadways considering truck geometry	
14	Panama Canal Expansion Study Phase 1 Report	US DOT Maritime Administration	Nov 2013	National Freight and Intermodal Facility Trends	FAF3 and PIERS data; Past tonnage through Panama Canal; Shipping routes and number of sailings; Top U.S. ports for foreign cargo; Historic containerized growth by port; 2010 and 2040 forecasted trade volumes (import and export) with world regions and by commodity		Includes the potential effects of the expansion; factors that shape impacts on U.S. ports and infrastructure; impacts on trade and the impacts on regions of the US; To meet the needs of larger ships at ports, port infrastructure improvements will be needed (cranes, storage, processing abilities, intermodal terminals)	Freight forecasting, market scenarios

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
15	Lafayette Route 11/460 Corridor Plan	Renaissance Planning Group	3/12/2012	Regional Transportation Plan	Current and forecast traffic; Existing conditions; Proposed/planned projects (including 603 improvements); Maps show study area, including a nearby school	Intersection analysis	Intermodal facility is expected to generate 18 trucks per peak hour and 235 truck trips per day by 2020; Planning for the eastern Montgomery County study area is needed to ensure a safe and efficient "eastern gateway" to the county; Proximity to Roanoke, I-81, and flat topography make it prime space for economic development; Mentions Ellison site and the possible rerouting of a nearby road, concern with truck traffic, and flooding of Roanoke River	BCA, Economic impacts
16	Village Transportation Links Plan: Final Report	Renaissance Planning Group	6/25/2007	Regional Transportation Plan	Maps of the Elliston intermodal area and proposed projects adjacent to the rail there; Cost estimates of projects		Bike, pedestrian, and greenways plan for Montgomery County; Plans for Shawsville, Elliston, and Lafayette are in the intermodal terminal area; Concern is mentioned over increased traffic to the intermodal facility; Recommendations for VDOT to construct pedestrian and bike facilities near the intermodal facility to offset traffic impacts	BCA, Economic impacts
17a	Economic Resources: Montgomery County 2025	Montgomery County	10/24/2004	Regional Economic Plan	Employment data 1970-2000 by sector; Top manufacturing employers for 2002; Comparisons of Montgomery County to other counties in the state for occupations, household incomes, per capita incomes, commuting patterns; community and economic development survey results		Economic goals for the county including land use and quality of life indicators and benchmarking, workforce development and training, location of economic resources and the quality of development, and developing and attracting economic resources; Commuting patterns briefly mentioned and mapped	Workshops; Traffic analysis
17b	Transportation Resources: Montgomery County 2025	Montgomery County	10/24/2004	Regional Transportation Plan	Total vehicle miles per 24 hours 1975-2001 for Montgomery, Floyd, Giles, and Pulaski Counties; Average traffic per mile of road; Commuting patterns in and out of the county	No forecasts	Transportation goals for the county including land use and transportation, highway, mass transit, and alternative transportation resources; Survey results show existing roads and traffic congestion are the most important issues to the public.	Traffic analysis

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
18	Virginia Supreme Court Ruling	Circuit Court of the City of Richmond	11/4/2011	Intermodal Feasibility Study	I-81 was designed to carry no more than 15% of its traffic volume as trucks, but was carrying as much as 40%; Widening it would cost $3 billion and ten years; A private entity must provide a minimum of 30% match toward the cost of the project; If 150,000 more containers do not move through the corridor after five years, NS owes a portion of the costs back to the state		Rules that the financial arrangement between VDRPT and NS is not a "line of credit" but is a grant; and VDRPT is funding a rail project that will increase road capacity, so it is a road project	General background of project status
19	Latin America Trade and Transportation Study: Virginia Report	Wilbur Smith Associates	Mar 2001	Statewide Freight Study	Cargo forecasts 1996-2020 for world and Latin America by type of cargo; Infrastructure needs for Virginia in terms of acreage for different types of cargo, and the costs for other parts of the world; Throughput and capacity charts for Virginia, the rest of the world, and Latin America; Physical characteristics of Virginia's airports; Rail tonnages for Virginia 1996-2020; Truck VMT in Virginia corridors for 1997 and 2020 and capacity needs	Date of the forecasts could be a concern	Using two scenarios (baseline to 2020 under normal growth, and 2020 under high growth) shows that under the base growth scenario 8.4% more highway miles will need capacity improvements, 6.4% increase in costs to address capacity needs, and 4.4% increase in annual pavement resurfacing costs; The high growth scenario was not estimated because the likelihood is unknown, but would be higher than those numbers presented; LATTS corridor 3 I-81 will be most affected by higher truck volumes; LATTS truck traffic in Virginia is expected to increase by 319% from 1997-2020	Freight forecasting, market scenarios

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
20	2013 Virginia Statewide Rail Plan	Virginia Department of Rail and Public Transportation	Nov 2013	Statewide Freight Study	Average annual daily truck traffic on the main highways (I-81 included) for 2011 and 2040; Track mileage by railroad classes in the state, including trackage rights; Tons of rail cargo originating and terminating in Virginia for some major commodities in 2010; The increase in containerized cargo at Virginia ports from 2013-2040; Distribution center announcements 2002-2011		Provides a list of projects and potential funding sources; Heartland Corridor double-stack project was mentioned, and truck/rail transfer facilities in the state were mapped; Average travel times to work are higher in Virginia than most neighboring states (except Maryland) and higher than the national average; The rail intermodal costs vs. performance were shown to potentially be competitive with trucks in terms of performance at a lower cost; Over half (53%) of freight in Virginia is internal or through-traffic, while 27% is inbound and 19% is outbound; Truck traffic on I-81 is expected to double from 2011 to 2040; Funding recommendations for rail projects in the Six Year Improvement Program includes $36.1M for the intermodal facility in Roanoke	Freight forecasting, market scenarios
21	Virginia's Long-Range Multimodal Transportation Plan; Corridors of Statewide Significance: Heartland Corridor	Office of Intermodal Planning and Investment	Mar 2010	Statewide Freight Study	Total freight tonnage by value and mode shows 75% of the tonnage and 99.2% of the value are carried by truck; Map of distribution centers; Freight tonnage and value by direction shows that most is through-traffic (71% by tonnage, 76% by value) on Heartland Corridor; Population projections of local jurisdictions		Corridor strategies show that supporting expanded freight capacity by expanding intermodal facilities focuses on freight corridors but also functions as an evacuation/link between urban centers, military access, education, and historic/tourism; The expanded intermodal facilities support the goals of system maintenance and preservation, mobility, connectivity, and accessibility, environmental stewardship, and economic vitality; To lesser degrees, the facilities support safety and security, and even lesser the coordination of transportation and land use	Market scenarios, mapping

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
22	Virginia's New River Valley: Comprehensive Economic Development Strategy 2013 Annual Report and 2014 Project Package	New River Valley Planning District Commission	2013	Regional Economic Plan	Funding packages for regional projects are listed for both 2013 and 2014	No freight or intermodal data included; Intermodal facility in Western Virginia not mentioned	Cluster analysis for the major industries' job creation 2006-2011 and geographic concentration (location quotient) shows high growth and concentrations in business and financial, energy, biomedical, agricultural business, and IT telecommunications industries; Investigation of an intermodal transportation facility in Dublin mentioned for an under-utilized army property; Goals and objectives for the region are included and prioritized	Market scenarios
23	Intermodal and the Roanoke Region	Roanoke Regional Partnership	4/1/2009	Intermodal Feasibility Study	Case studies of other intermodal facilities including Alliance, Huntsville, and the Virginia Inland Port; 2007 commodity data for Port of Virginia; successful approaches to economic development, existing businesses	No original data	Provides case studies of the experience of other intermodal facilities including Alliance, Huntsville, and the Virginia Inland Port; Also presents case studies of successful approaches to economic development associated with intermodal facilities including Rickenbacker, KC SmartPort, and Joliet Arsenal Development Authority	Market scenarios
24	Virginia Multimodal Freight Plan, Draft Report	Cambridge Systematics for the Office of Intermodal Planning and Investment	Nov 2013	Statewide Freight Study	Data is the same as the data collected for the Virginia Intermodal Freight Study, Phase 1 (Document 7a)	2004 TRANSEARCH data is prior to economic recession and opening of Heartland and Crescent Corridor improvements	Provides the vision, goals, and investment strategies to keep freight moving statewide; framework for assessing freight performance; freight corridor categorization (national and state); stakeholder interviews	Workshops, freight forecasts, market scenarios
25	Northern Minnesota/Northwestern Wisconsin Regional Freight Study	Wilbur Smith and Associates for Minnesota Department of Transportation	August 2009	National Freight and Intermodal Facility Trends	Used TRANSEARCH database to estimate demand for an intermodal facility. Provided estimates for costs including costs per lift; density flow of consumer products through the region; export grain history and forecasts	Data and maps not applicable to the Roanoke area	In general, the minimum annual lifts a facility should handle to be feasible is 12,000-24,000 and users expect three trains per week. Notes other qualities an intermodal facility should have, including a container pool, parking, and adjacent warehouse space. Encourages the development of a Regional Freight Advisory Committee, cooperation between states for freight regulations, and involving the public in planning efforts.	Workshops, market scenarios, recommendations

Document Number	Title	Author	Date	Category	Description of Existing Data Provided	Potential Gaps	Analysis Conducted	Applicability to Later Tasks
26	Will County Inland Port Infrastructure Analysis	CDM Smith	3/9/2012	National Freight and Intermodal Facility Trends	Economic activity was measured using IMPLAN for Will County and is not applicable to the Roanoke area.	Data and maps not applicable to the Roanoke area	Intermodal facilities in the county handle 6M TEUs per year, resulting in 25,000 trucks per day. Recommended a regional freight network for stakeholders to share information. Four recommendations were listed for creating the advisory group: set clear goals; have credible leadership; pursue outcome-focused approaches, and provide two-way communication. Two common issues being experienced in Roanoke include overlapping interested/affected jurisdictions and inconsistent trucking regulations across municipalities.	Workshops, market scenarios, recommendations

Appendix D: Variable Descriptions

Variables Descriptions and Ranges

Western Virginia Intermodal Facility Economic and Transportation Impacts Study

Introduction

The purpose of this document is to outline the variables that will be discussed as part of the Market Scenarios workshop on May 14, 2014. The variables are described here to give some background on what they are and how they can affect the analysis. In addition to the description of the variable, the suggested range of the variable to be quantified in the analysis is listed.

A small number of Benefit Cost Ratios (BCRs) will be estimated – likely two or three. When formulating the scenarios to analyze, please keep in mind that there are four variables each with varying degrees described below, and there is the possibility for more based on our discussions at the workshop. Finally, the variables can be analyzed at any degree, not just those listed below. Those listed below are just starting points for discussion.

Cost

The cost of the facility is a major input in the Benefit Cost Analysis (BCA) because it, in conjunction with the O&M cost, is the denominator that all of the benefits are compared to. Small changes in the cost of the project or schedule of construction can result in variations in the BCR. As a result, a range of costs could be considered in the market analysis task that would contribute to a range of BCRs for the project. The facility was originally estimated to cost estimated $36M. Also to be considered is the possibility of grant funding and the amount.

Suggested range of the variable:

- $71 million – this is the updated cost from Norfolk Southern, estimated in late 2013. The updated cost includes the cost of extra lead track needed to avoid conflicts with the Crescent Corridor, as well as costs for relocating Cove Hollow Road. The facility remains at the same size as originally planned – 65 acres and 15,000 lifts per year.
- $79 million – this is the AECOM estimated cost of the facility as estimated in April 2014, to the same specifications as the NS facility.
- Assumption on grant funding? What amount?

Type of Facility (influences market capture)

The type of facility considers capabilities that will be part of the functionality of the facility. For example, the site has been planned as 65 acres and approximately 3,000 feet of intermodal track. These are constants as the site is space-constrained. However, based on the stakeholder workshops, feedback supported considering a variety of other functions. The type of facility will determine the volume of containers that the facility can process, and influences the market capture of the facility. Facility ownership is also considered in this variable. As market capture increases, so do operating costs. Market capture is greater with the 3rd option, but so are operating costs.

Suggested range of the variable:

- “as is” – this is, on the low-end, how the facility has been envisioned for years. It would consist of 65 acres with minimal storage for chassis and containers, no services on-site, and the facility would be operated by Norfolk Southern.
- “logistics center” – this type of facility would again be on 65 acres, but would dedicate some space on-site for container and chassis storage. The facility could be operated by NS or a 3rd party. Assumes an approximate market share increase of 10%.

- "inland port" – this type of facility would again be on 65 acres, but would dedicate some space on-site for container and chassis storage and also be a Foreign-Trade Zone subzone and have customs on-site. The facility would be operated by the Port Authority. Assumes an approximate market share increase of 20% above the baseline.

Routes (influences growth)

The routes served are considered. Based on the workshop and interview feedback, Norfolk Southern felt that the markets that would be the most competitive for their operations would be Roanoke/Chicago and Roanoke/Columbus. This is because there are large distribution centers in Columbus, and Chicago opens up access to western markets. In addition, they are far enough from Roanoke for truck to be less competitive. Unless gas prices rise substantially, NS felt that these are the closest markets where they can operate successfully.

Suggested range of the variable:

- Primarily serves the Roanoke/Chicago routes, as NS states.
- Serves as a regional hub for regional markets while still serving the Roanoke/Chicago routes. Would also serve the Northeast and Southeast routes along the Crescent Corridor.
- Serving Norfolk as another distribution center, it would serve national markets. It would open trade routes for the West Coast destinations and West Coast Ports, while still serving the Roanoke/Chicago routes.

Volume/Users (influences growth)

This variable considers both the volumes that go through the facility as well as the users of the facility, because they are inherently related. It is important to keep in mind when considering this variable that the Type of Facility variable would also determine the logical volume and users. This variable ranges for the Panama Canal volumes expected and the number of lifts assumed at the facility. It also considers the proximity of shippers that it primarily serves. It is important to note that, per stakeholder feedback, demand for the facility would serve mostly exports (outbound from Roanoke).

Suggested range of the variable:

- The Panama Canal opens to limited use and the intermodal facility operates below expectation with only 5,000 lifts per year. It primarily serves the local shippers that dray to and from the site.
- The Panama Canal opens to its expected level of use and so does the facility – 15,000 lifts per year. The facility primarily serves the local shippers that dray to the site, and also attracts the regional distribution centers. Two anchor tenants use the facility, perhaps Gatorade and MeadWestvaco. The facility attracts a new firm that also increases volumes.
- The Panama Canal opens to above its expected level of use and so does the facility – 25,000 lifts per year. The facility serves the local shippers that dray to the site and the regional distribution centers, but primarily serves its largest anchor tenants. Anchor tenants might include MeadWestvaco, Gatorade, Advance Auto Parts, Celanese, and furniture distribution centers. The Anchor Tenants have regular shipments between Roanoke and the Port, as well as locations west.

Appendix E: Stakeholder Feedback

From: Tom Cain [mailto:roanokeimpact@earthlink.net]
Sent: Tuesday, August 05, 2014 9:28 AM
To: mmccaskill@rvarc.org; wstrickland@rvarc.org
Cc: Richard Kurshan; Bill Modica
Subject: RE: status of environmental analysis of the proposed intermodal transportation facility.

Good Morning, Mark and Wayne,

Environmental and health considerations ought to be among the "economic" information that anyone contemplating location of an industrial facility takes into account. They can't be segregated out from any meaningful analysis. The obvious problem with abstracting site considerations in order to commission a somewhat generic feasibility analysis is that the consultant may conclude that a project is doable when what the Commission actually needs to know is whether a proposal is a good idea for development here.

There is a very helpful report by the G8+5, "The Economics of Ecosystems & Biodiversity: Mainstreaming the Economics of Nature" http://www.teebweb.org that I hope the Commission and its consultants will read and begin to factor into their understanding of developmental economics.

The Roanoke headwaters region has everything to gain by valuing the fact that much of the Southeastern United States lies downstream. The "stakeholders" in how we develop here are many - even if unseen and incompletely conceptualized. With topography and gravity on our side, we have everything to gain from being very protective of our regional environmental quality.

All good wishes, T.

-----Original Message-----
From: "mmccaskill@rvarc.org"
Sent: Aug 5, 2014 8:30 AM
To: "wstrickland@rvarc.org" , Tom Cain
Subject: RE: status of environmental analysis of the proposed intermodal transportation facility.

Tom,

Thank you for your interest.

Unfortunately, I was misquoted in the newspaper article, and there were other inaccuracies. I'm sure that you have had similar experiences with the media over your career. I remember you from your Project Impact days when I was new at RVARC.

Quite simply, the purpose of the study is to evaluate whether the Intermodal Facility makes business/economic sense period. The study is agnostic concerning a possible ownership structure of the facility. This is where the confusion came about on the part of the RT reporter. I explained that we weren't assuming that NS would own or operate any facility, and that were focused on whether it was feasible for any organization (NS or anyone else) to operate the facility given the downturn, Panama Canal widening etc. It is unfortunate that the RT tried to play up this "Authority" concept, because that is not the focus of the study.

As far as the environmental impacts are concerned, the study is an economic/business feasibility study. It is not a site analysis or environmental impact study. The study is trying to accomplish a very simple goal: to give all stakeholders up-to-date unbiased information on the economic impact and business feasibility of the facility (as originally defined) given today's data, economic conditions and freight/logistics flows.

Sincerely,

Mark

Mark McCaskill, AICP
Director of MPO Programs
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From: wstrickland@rvarc.org
Sent: Monday, August 04, 2014 5:59 PM
To: Tom Cain
Cc: mmccaskill@rvarc.org
Subject: Re: status of environmental analysis of the proposed intermodal transportation facility.

Tom,
Thanks for your interest in our work on the proposed Intermodal Facility. I'll ask Mark McCaskill, the project leader of the study if he can respond to your questions.
Wayne

Sent from my Verizon Wireless 4G LTE DROID

Tom Cain <roanokeimpact@earthlink.net> wrote:
Dear Wayne,

I assume the feasibility study of the proposed Elliston intermodal railyard will address the legality of owning and operating a facility outside the jurisdictions of collaborating governments. But, does the on-going study include an environmental impact analysis?

If my memory is correct, Norfolk Southern asserted that it was not required to conduct a review of project environmental impacts beyond endangered species (the Roanoke Logperch) because they operate under the authority of the Interstate Commerce Commission. That assertion never made sense to me as the project has always been predicated upon the majority investment of public money - apparently 70% public funding.

I'm sure the Commission agrees that, as a matter of sound public policy, major projects depending on the expenditure of public money should always value protection of public safety, health and well-being first. The location and operation of an intermodal transfer station in a narrow mountain valley next to headwaters of the Roanoke River by jurisdictions not under auspices of the ICC certainly requires thorough study [- especially in light of the experience of spills into the Elk River in neighboring West Virginia].

In general, I support intermodal transportation. However, it needs to be created and operated after all potential public safety concerns have been fully examined and addressed.

Kind regards, T.

Tom Cain
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