

The Northeast – Southeast – Midwest Corridor Marketing Study

*EXAMINING THE POTENTIAL TO DIVERT HIGHWAY TRAFFIC FROM
INTERSTATE 81 TO RAIL INTERMODAL MOVEMENT*

Executive Summary

Prepared for the

The logo for the Virginia Department of Rail and Public Transportation (DRPT) features the letters "DRPT" in a large, bold, white, sans-serif font. The letters are set against a dark blue background that has a subtle gradient and a slight shadow effect, making the text stand out prominently.

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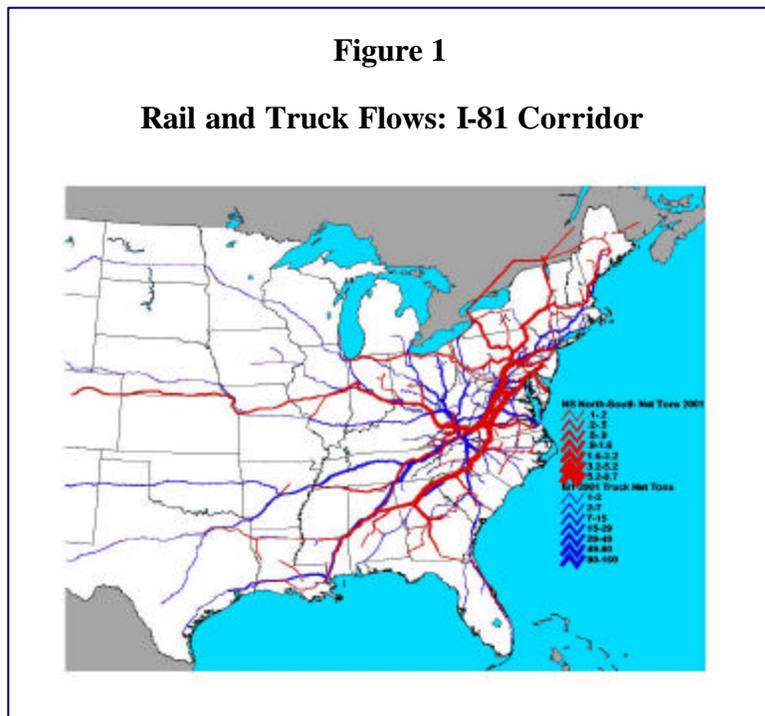
THE NORTHEAST – SOUTHEAST – MIDWEST CORRIDOR MARKETING STUDY

EXECUTIVE SUMMARY

1. Introduction

Two Commonwealth-sponsored studies prior to this report analyzed the relationship between highway freight traffic and rail intermodal service in Virginia, along a north-south corridor focused particularly on Interstate 81. Rail intermodal is a cooperative service where trucks pick up and deliver their shipments, but the truck trailer (or container) is carried between cities by rail, thus reducing the number of trucks that have to travel by highway. The two studies were motivated by rising projections of highway congestion, by truck traffic growth exceeding what the highways were designed to handle, and by the perceived concern for safety among citizens whose automobiles share the road with commercial vehicles.

The collective analysis contained in these studies suggested that the opportunity to divert heavy truck traffic to rail intermodal would provide significant positive benefits to the Commonwealth. However, such a diversion could not be accomplished without substantial corridor-wide investments in the parallel rail infrastructure. A closer look was warranted and with federal funds to partially underwrite it, the Virginia Department of Rail and Public Transportation, commissioned the Northeast – Southeast – Midwest Corridor Marketing Study (the Study). Its purpose was to determine whether the Commonwealth should change the current calculus by injecting public capital into the development of competitive rail intermodal service for the I-81 corridor. Specifically, the Study sought to determine (1) is there a marketplace demand for improved intermodal service in the corridor; (2) what type of service offering will generate the greatest diversion benefit to the corridor; and (3) what level of public investment in rail intermodal will materially impact the level of highway commercial traffic for I-81?



2. Issues, Limitations & Risks

On Interstate Highway 81 at most times of day, about every third vehicle is a truck, and this is about double what the road was designed for. Motorists who share the road with commercial trucks often will feel unsafe and blame the larger vehicles for their concern, even when the trucks are carefully driven. A common solution for motorists is to try to separate themselves from trucks by passing or changing lanes; another way to accomplish the same purpose is to use the innate separation of the railroad system to carry truck freight. The Virginia Legislature recognized the concerns of its citizens in SJR-55 when it cited safety as a primary reason to shift highway freight to rail, and indicated that possibility should be examined in the studies that culminated in this report.

The Legislature also recognized that freight traffic crosses state boundaries, and that individual pieces – like particular highway corridors within Virginia – are interdependent parts of a larger network. Traffic shifts in the Commonwealth of Virginia will be created by investments and actions in other states, and investments made by the Commonwealth will produce benefits for others as well as for itself. The resolution HJR-704 called for cooperation with other states to produce a network of rail intermodal facilities, in order to reduce heavy truck traffic on Virginia highways.

The initiatives envisioned by the Legislature necessarily face a series of issues, limitations and risks. The prominent ones concern coalitions, capital cost, public benefits, local resistance, the addressable market, and carrier performance:

- *Coalitions:* Other states may be unable or unwilling to make or support railroad investments. This report therefore considers two levels of public involvement:
 - Corridor-wide, where multi-state coalitions work in partnership with Virginia and the railroads to make network investments, and public capital is applied to infrastructure from New York to New Orleans. This produces a higher volume of traffic diversions;
 - Virginia-based, where the Commonwealth makes rail investments inside its borders, while its railroad partners act both outside and within the state. This produces a lower volume of traffic diversions.

Two investment alternatives are considered in this analysis:

- Corridor-wide strategy
- Virginia-based strategy

In practice, Virginia-based investments can be the forerunners of a corridor-wide

program, and in fact, the capital requirements for Virginia rise in the corridor-wide plan because it accumulates more volume over time. It is also true that a multi-state coalition may be formed with several but not all states of the corridor participating. Rail programs in these states today range from minor to large, yet the scope of the I-81 initiative breaks new ground.

- *Capital Cost:* Willing partners may be unable to finance the investments called for in this report, or may finance them incompletely. This is important because a corridor infrastructure program covers hundreds of miles and costs a great deal of money: from hundreds of millions of dollars in Virginia, to billions of dollars corridor-wide. Federal funding possibly can offer an alternative, but that too may be unavailable or insufficient. Although capital investments often have to be made in a series of whole steps (because half measures get less than half the results), in general less funding will lead to fewer traffic diversions.
- *Public Benefits:* Related to costs are benefits, of course. While this Study was commissioned to measure the volume but not the benefits of highway traffic diversions to rail, there are some obvious payoffs for the public: road congestion generally will be lower, motorists will feel safer, and there will be more capacity to deliver business and consumer goods. There are associated benefits as well, which include:
 - Reduced highway user costs and avoided highway investments;
 - Improved transportation fuel efficiency and lower environmental emissions;
 - Greater competitiveness for U.S. industry through gains in logistics productivity;
 - Transportation network redundancy, which is an aid to national security and emergency response.
- *Local Resistance:* Freight traffic taken from the highways means more freight trains moving on the rails. Citizens in the sections of Virginia that could see train growth may find it unwelcome, and their resistance could leave the trucks on the road. Likewise, local businesses that depend on high-volume truck activity (such as truck stops or fueling stations) might see their commercial opportunities diminished as a result of reduced highway growth rates. This report recommends investments in what promise to be the most practical rail routes. However, as with many public decisions, there are trade-offs to be debated and weighed.

- *Addressable Market:* A significant portion of truck traffic can never use rail intermodal service, because the shipments don't travel far enough, or they have to move too fast, or they don't go where the railroad is, or they would cost too much to travel another way. However, there is also a significant portion of truck traffic that rail could handle, but has not adequately addressed. This report looks to a newer generation of railroad equipment in order to make intermodal service appeal to as much of the truck business as possible, and to more of the truck business than usual. The effect is that the *percentage* of trucks in the I-81 traffic stream can be reduced by rail diversion, yet the sheer *number* of trucks in the corridor will continue to grow.
- *Carrier Performance:* Equality of service between intermodal and highway transportation is called for by customers and developed in this Study. It must be produced by railroads and sustained through the years it will take to build diverted volume. If the service is compromised, diversions will drop. The Commonwealth therefore will want performance commitments from its rail partners to back up its investments. Conversely, highway travel time is projected by Virginia DOT to worsen with congestion in the coming years. This slows down truck service and acts as a mild stimulus to traffic diversions. This Study assumes no major corrective investment will be made to improve truck service on the roads. On the other hand, it also assumes that no highway tolls will be imposed that might encourage the use of rail.

3. The Northeast – Southeast – Midwest Corridor Marketing Study

Four primary tasks comprised the Study: (1) conduct of surveys and interviews with shippers and network motor carriers, to determine the level of marketplace interest in and performance criteria for competitive rail intermodal service in the corridors; (2) investigation of service design alternatives to identify the right combination of rail intermodal product, cost, and performance features for the demands of the marketplace; (3) performance of detailed diversion analysis to determine the rate, magnitude, and composition of projected modal shifts accruing to the introduction of an improved intermodal service; and (4) definition of the level and location of capital investment required to support the projected modal shift.

3.1 *Shipper and Carrier Interviews and Surveys*

Primary market research was conducted among the freight users of the Commonwealth highway corridors. Users fell into two general categories: shippers whose goods travel in

Virginia on their way to market, and the motor and rail carriers who serve such shippers. The results of this analysis are consistent with national trends and portray both shippers and carriers as willing to shift traffic to rail intermodal if their cost and service demands are routinely satisfied.

The research reveals marketplace demands that current rail intermodal service offerings do not provide. These include (1) a rail intermodal technology that is less restrictive to the current mix of highway trailers; (2) a single-driver¹ truck competitive service that includes frequent service departures and 95-98% on-time delivery, door to door; and (3) a significant economic incentive to offset the added complexity and coordination of rail intermodal operations.

While current CSX and NS intermodal operations seek to provide these features, motor carriers and shippers alike indicated that current product offerings routinely fall far short of this benchmark.

3.2 Service Design and Diversion Analysis

The key dynamic in the traffic diversion analysis conducted for this Study is public investment that allows the introduction of new intermodal services, raises their performance characteristics, and reduces the structural cost of railroading by moderating its capital intensity. The new services constitute a versatile and more effective product proposition that satisfies the needs of shippers by meeting the operating specifications of motor carriers. Traffic is won away to rail particularly by appealing to motor carriers to substitute intermodal for their “line-haul” intercity road operations. The appeal is persuasive because it offers fully equivalent performance at a significantly lower cost than the motor carriers can achieve on the highway, and it accommodates any trailer equipment in a standard truck fleet without modification or penalty.

Intermodal services are supposed to be based on compatibility between rail and highway transportation. However, many kinds of truck equipment can't be handled by traditional rail, and those it *can* handle often need special modification. This is a major flaw in conventional intermodal services, but it is eliminated by a newer generation of railcar. This railcar (already in regular use in Canada) employs an open style of technology that can carry almost any of the truck trailers moving on today's highways. This Study adopts this railcar to help establish real compatibility between railroads and trucking, and in so doing to increase the size of the addressable market for intermodal. Motor carriers acting in partnership with rail ultimately can reduce their cost of operation without special investment or sacrifice in performance, and shippers can receive the service they seek while improving on its economy. These factors combine to create a strong reason for traffic diversions.

Highway diversions in this Study are further aided by two network effects. First is the confluence of large volumes of through truck traffic in Virginia, where the national highway system is channeled between the mountains and the sea. This channeling causes traffic to concentrate into trainload quantities for sustained distances, which appropriate rail terminals and service design can exploit. Second, as its geographic scope, north-south interconnection and service frequency expand, the rail intermodal network begins to duplicate the fleet balance economy motor carriers produce over the road, enabling these carriers to retain their efficiency as their rail use grows.

The series of influences that public investment initiates - service improvement, capacity and system expansion, equipment availability, and lower cost-to-market - were incorporated in a quantitative process to project traffic diversions in the I-81 corridor. Its estimation techniques were based on detailed competitive analysis and patterns of historical preference that have been successfully tested in previous freight studies over the last decade. The diversion results mirror the representations of shippers and carriers who operate in the corridor: that service parity coupled with strong cost reductions generates meaningful mode shifts.

3.3 Required Capital Investment

Capital investments in the rail corridor are required to improve service speed and terminal access to render rail offerings competitive, and to expand capacity in order to handle additional traffic as it is diverted. The proposed improvements are designed to fulfill the product strategy, and to support the full volume of rail traffic projected in the long-range diversion analyses. They include multiple tracks and passing sidings that work like additional lanes on highways, signaling systems that raise the frequency and speed at which trains can be safely run, and the construction of larger and new intermodal terminals to transfer loads between highway and rail. Improvements are to be made potentially on both NS and CSX rights-of-way, in Virginia and other states.

The states included in the corridor-wide analysis represent those impacted by the current and future I-81 congestion, and/or those deriving off-corridor benefits through the conversion of highway traffic to rail intermodal. Those states include Texas, Louisiana, Mississippi, Alabama, Tennessee, Georgia, North Carolina, South Carolina, Virginia, West Virginia, Maryland, Pennsylvania, and New Jersey.

4. Results of the Study

The results of market research and detailed competitive analysis completed for this Study suggest that public investment in rail intermodal infrastructure can produce material relief

for highway traffic in the I-81 corridor, and that this impact can be made to occur in a practical time frame.

4.1 Corridor-Wide Results

An initial, medium-term investment between \$2.6 and \$2.8 billion across the corridor, produces highway diversions between 670,000 and 720,000 annual truck loads over three to five years, after construction. One out of seven trucks is removed from I-81 in Virginia, and the percentage of trucks in its traffic stream drops from every third vehicle to every fourth. The Virginia portion of this initial investment is \$540 to \$590 million.

Over another ten to twelve years, a cumulative investment between \$7.3 and \$7.9 billion builds highway diversions to a range of 2.8 to 3.0 million truck loads annually. Two out of seven trucks are removed from I-81 in Virginia, and the percentage of trucks in its traffic stream holds steady at 25%, despite strong commercial growth. The Virginia portion of the total long-term investment is \$1.3 to \$1.4 billion. Viewed incrementally, the additional dollars after the initial investment are approximately \$5 billion corridor-wide, and \$800 million in Virginia.

The set of corridor-wide investment and diversion results are summarized in Tables 1 through 4. Low and high scenarios are presented as ranges for public investment, over medium and long term time horizons. The tables distinguish the major activity on the Norfolk Southern (NS) lines that parallel I-81, from the lesser activity on CSX lines. The term AADTT refers to Average Annual Daily Truck Traffic, and is used here to measure the rate of truck diversion from the Virginia sections of the highway. The term VMT refers to Vehicle Miles Traveled, and is a measure of the reduced truck usage of the highway.

4.2 Virginia-Based Results

A medium-term public investment of approximately \$500 million in Virginia alone, produces highway diversions between 470,000 and 500,000 annual truck loads over five to seven years, after construction and across the corridor. Diversions from the Virginia-based investment take longer to fully mature (five to seven years, versus three to five years in the initial Corridor-Wide program) because the investments are lower and more restricted, and thus makes their influence less strong. Three elements – the network effects of Virginia investments, improvements Norfolk Southern will make inside and outside the Commonwealth with other funds, and the fact that so much truck travel begins and/or ends beyond its boundaries - cause the Virginia-based program to create diversions in multiple states. In the Commonwealth itself, one out of ten trucks is

removed from I-81, and the percentage of trucks in the I-81 traffic stream drops from every third vehicle to approximately every fourth.

Local resistance to this program is apt to be less, because train volumes will be lighter. However, no additional, long-term diversions are produced from Virginia-based investment, for two reasons. First, all of the programmed capital is expended in the medium term; more funds to support the continuing build-up of diversions are assumed to be unavailable. Second and relatedly, the Norfolk Southern system reaches capacity once medium-term diversions are achieved, and it cannot absorb more traffic without investments in other states. The consequence is that freight traffic on the highway will continue to grow along with the economy, but rail traffic cannot grow. Over another eight to ten years, and based on Virginia DOT forecasts, the proportion of trucks that rail has been able to remove from I-81 becomes one out of twenty (because rail numbers stay the same while highway numbers get bigger), and the percentage of trucks in the highway traffic stream climbs back to one out of three. This result can be viewed to say that Virginia-based investments work best as a first step toward a corridor-wide program. It can also be viewed to say that Virginia may undertake what it can, but no single state has broad influence over its patterns of traffic.

The set of Virginia-based investment and diversion results are summarized in Tables 5 and 6. Low and high scenarios again are presented as ranges for public investment, and the effects are shown for the medium and long-term time horizons.

4.3 Implications

The proposed investments successfully reduce highway volumes because they help deliver a reformed railroad product offering. The product relies upon: (1) a flexible or “open” intermodal technology that accommodates highway trailers of essentially all types; (2) intermodal service that is fully competitive with single-driver truck performance over the road; and (3) a compelling economic advantage produced through public-private cost sharing. In this configuration, the core of the domestic truck business – the standard highway trailer – is addressed with an intermodal product that is not an inferior good, and with an economy that many motor carriers and shippers will feel they can’t walk away from in a competitive market. Public capital is used to concentrate rail investment in a single corridor through the Commonwealth of Virginia where it might not otherwise be focused, and to a degree that it yields visible benefits for citizens. Thousands of heavy trucks per day can be diverted to a naturally separated rail route, leaving motorists feeling safer and the highways less congested.

The traffic diversions produced in this Study are material and the long-range, corridor-wide projections may appear dramatic, but they are by no means unprecedented for

mature intermodal lanes. Similar intermodal traffic participation is seen today in comparable lanes elsewhere in the country, where high levels of rail service have been offered for sustained periods of time. In addition, the relatively large number of through trucks channeled through I-81 in Virginia makes diversions in the Virginia sections correspondingly large. A roadway with a higher percentage of local traffic would offer fewer opportunities. Finally, the competitive outcomes expected by this Study really are a normal business result: genuinely good and accessible service from a low cost provider usually wins customers. The factors that will most matter to achieving these results are the procurement of financing and perhaps multi-state cooperation, the organization of citizen support, and the long-term performance of the railroads.

The Commonwealth has favored a multi-modal approach to freight transportation, in this context meaning that it believes highway and rail options both are essential. This Study supports that approach. In an environment of significant freight traffic growth on Virginia highways, the long-range, corridor-wide diversions and investments succeed in absorbing about 60% of the additional truck volume forecast for I-81 by VDOT, and the Virginia-based program absorbs just 10%. In the medium term, there is an absolute reduction in the number of trucks from today's levels, but ultimately the number of trucks will grow under *both* investment scenarios – and meanwhile, automobile activity is steadily rising, too. Consequently, while rail initiatives provide very substantial capacity for the movement of freight, *highway expenditure continues to be necessary*.

5. Conclusions and Recommendations

This Study demonstrates that public investment in rail intermodal infrastructure can produce material relief for highway needs in a practical timeframe. These results are supported by the market research and detailed competitive analysis that comprise this Study. A capital program based inside Virginia could win a moderate amount of highway relief, or greater relief could be sought with a corridor-wide, multi-state program. The financing requirements are challenging in either case, and financing is not the only issue. Moreover, the scope of the corridor-wide plan is such that it can be compared to large, interstate highway initiatives, but it has no parallels in recent public rail investment. Even so, this is precisely the kind of rail program that the American Association of State Highway Transportation Officials (AASHTO) called for, when they said, “states and railroads must make (their) partnership extend beyond state boundaries, and set priorities for network-level investments. The need today is to treat the key elements of the national (rail) network – nationally significant corridors, intermodal terminals, and connectors.”ⁱⁱ

Virginia can choose not to act, but the situation for its citizens on heavily traveled roadways will worsen, and the freight system will be slowed. It can choose to act alone,

but the construction it undertakes inside the Commonwealth produces a shared benefit, because it reduces highway volumes for its neighbors. And, with 70% of its truck traffic beginning or ending travel outside Commonwealth borders, Virginia and a number of other states are interdependent for freight service. Interdependence and shared benefits constitute a clear argument for coordinated, multi-state action and contribution.

States face limited options for the provision of capacity, railroads face limited capital and prospects for growth, motor carriers seek lower costs of effective operation to satisfy their customers, and motorists want peace of mind as they drive. For all of these parties, the intermodal initiatives explored in this Study can be part of the solution. They offer no solution unless the challenges of coalition, financing, and public support can be faced and answered, but the effort to face them is plainly worthwhile.

Table 1 – Corridor-Wide Investment**Projected Medium and Long-Term Diversion Impacts - NS Corridors**

Medium Term Annual Impact	Annual Loads Diverted Total Corridor ⁱⁱⁱ	Percent of VA I-81 AADTT Diverted	VA I-81 Truck VMT Diverted (Millions)
Public Investment Scenario ^{iv}			
Low	670,000	13.7%	179.6
High	720,000	14.6%	190.5

Long Term Annual Impact	Annual Loads Diverted Total Corridor	Percent of VA I-81 Forecast AADTT Diverted	VA I-81 Truck VMT Diverted (Millions)
Public Investment Scenario			
Low	2,790,000	28.2%	759.1
High	3,000,000	30.3%	811.9

Assumptions:

1. Adequate capital financing and multi-state cooperation can be procured.
2. Local resistance does not preclude growth in rail traffic.
3. An “Open” Intermodal technology will be employed in the study corridors.
4. Railroads will offer and maintain competitive service performance in the study corridors.
5. Railroads will offer compelling cost reductions (vis-à-vis highway transport) to shippers and/or carriers currently operating on the study corridors as an offset to public investment.
6. The available infrastructure can be configured to accommodate the identified traffic growth.
7. Historical patterns of intermodal market penetration are an appropriate measure of projected penetration for lanes of similar density and distance.
8. The VDOT-approved “No-Build” scenario for I-81 remains in place, and truck tolls are not imposed.
9. Proposed changes to Federal Hours of Service motor carrier regulations ultimately are implemented.

Table 2 – Corridor-Wide Investment**Medium and Long-Term Capital Needs Assessment – Total for NS Corridors**

Medium Term Investment	Capacity and Speed Improvements	Terminal Expansion and Construction	Rolling Stock Acquisition	Total
Public Investment Scenario	(Millions)	(Millions)	(Millions)	(Millions)
Low	\$1,974	\$339	\$337	\$2,649
High	\$2,153	\$339	\$354	\$2,846

Long Term Investment	Capacity and Speed Improvements	Terminal Expansion and Construction	Rolling Stock Acquisition	Total
Public Investment Scenario	(Millions)	(Millions)	(Millions)	(Millions)
Low	\$5,841	\$507	\$985	\$7,333
High	\$6,372	\$507	\$1,020	\$7,899

Assumptions:

1. Adequate capital financing and multi-state cooperation can be procured.
2. Investments levels projected above provide capacity for diverted volumes plus organic growth of between 20% and 30%.

Table 3 – Corridor-Wide Investment**Projected Medium and Long-Term Diversion Impacts – CSX Corridor**

Medium Term Annual Impact	Annual Loads Diverted Total Corridor	Percent of VA I-81 AADTT Diverted	VA I-81 Truck VMT Diverted (Millions)
Public Investment Scenario			
Low	170,000	0.2%	1.9
High	180,000	0.2%	2.4

Long Term Annual Impact	Annual Loads Diverted Total Corridor	Percent of VA I-81 Forecast AADTT Diverted	VA I-81 Truck VMT Diverted (Millions)
Public Investment Scenario			
Low	620,000	0.4%	7.9
High	700,000	0.4%	8.8

Assumptions:

1. Adequate capital financing and multi-state cooperation can be procured. No improvements specific to CSX facilities and track structure were projected.
2. Local resistance does not preclude growth in rail traffic.
3. An “Open” Intermodal technology will be employed in the study corridors.
4. Railroads will offer and maintain competitive service performance in the study corridors.
5. Railroads will offer compelling cost reductions (vis-à-vis highway transport) to shippers and/or carriers currently operating on the study corridors as an offset to public investment.
6. The available infrastructure can be configured to accommodate the identified traffic growth.
7. Historical patterns of intermodal market penetration are an appropriate measure of projected penetration for lanes of similar density and distance.
8. The VDOT-approved “No-Build” scenario for I-81 remains in place, and truck tolls are not imposed.
9. Proposed changes to Federal Hours of Service motor carrier regulations ultimately are implemented.

Table 4 – Corridor-Wide Investment**Medium and Long-Term Capital Needs Assessment -- Virginia Portion of Corridor-Wide Improvements**

Medium Term Investment	Capacity and Speed Improvements	Terminal Expansion and Construction	Rolling Stock Acquisition	Total
Public Investment Scenario	(Millions)	(Millions)	(Millions)	(Millions)
Low	\$432	\$40	\$72	\$544
High	\$472	\$40	\$76	\$588

Long Term Investment	Capacity and Speed Improvements	Terminal Expansion and Construction	Rolling Stock Acquisition	Total
Public Investment Scenario	(Millions)	(Millions)	(Millions)	(Millions)
Low	\$1,001	\$40	\$212	\$1,253
High	\$1,091	\$40	\$219	\$1,350

Assumptions:

1. Adequate capital financing and multi-state cooperation can be procured.
2. Investments levels projected above provide capacity for diverted volumes plus organic growth of between 20% and 30%.
3. Virginia contribution to rolling stock is based on proportional contribution to overall corridor improvements.

Table 5 – Virginia-Based Investment**Projected Medium and Long-Term Diversion Impacts - NS Corridors**

Medium Term Annual Impact	Annual Loads Diverted Total Corridor	Percent of VA I-81 AADTT Diverted	VA I-81 Truck VMT Diverted (Millions)
Public Investment Scenario			
Low	474,000	9.8%	132.7
High	501,000	10.4%	143.5

Long Term Annual Impact	Annual Loads Diverted Total Corridor	Percent of VA I-81 Forecast AADTT Diverted	VA I-81 Truck VMT Diverted (Millions)
Public Investment Scenario			
Low	474,000	4.9%	132.7
High	501,000	5.2%	143.5

Assumptions:

1. Adequate capital financing can be procured.
2. Local resistance does not preclude growth in rail traffic.
3. An “Open” Intermodal technology will be employed in the study corridors.
4. Railroads will offer and maintain competitive service performance in the study corridors.
5. Railroads will offer compelling cost reductions (vis-à-vis highway transport) to shippers and/or carriers currently operating on the study corridors as an offset to public investment.
6. The available infrastructure can be configured to accommodate the identified traffic growth.
7. Historical patterns of intermodal market penetration are an appropriate measure of projected penetration for lanes of similar density and distance.
8. The VDOT-approved “No-Build” scenario for I-81 remains in place, and truck tolls are not imposed.

9. Proposed changes to Federal Hours of Service motor carrier regulations ultimately are implemented.

Table 6 – Virginia-Based Investment

Medium Term Capital Needs Assessment - Total For NS Corridors

Medium Term Investment	Capacity and Speed Improvements	Terminal Expansion and Construction	Rolling Stock Acquisition	Total
Public Investment Scenario	(Millions)	(Millions)	(Millions)	(Millions)
Low	\$242	\$21	\$229	\$492
High	\$242	\$21	\$238	\$501

Long Term Investment	Capacity and Speed Improvements	Terminal Expansion and Construction	Rolling Stock Acquisition	Total
Public Investment Scenario	(Millions)	(Millions)	(Millions)	(Millions)
Low	N/A	N/A	N/A	N/A
High	N/A	N/A	N/A	N/A

Assumptions:

1. Limited network of terminals including Meridian, MS; Huntsville, AL; Atlanta, GA; Knoxville, TN; Alexandria, VA; Harrisburg, PA; Philadelphia, PA; and Elizabeth, NJ.
2. Additional right of way improvements in West Virginia and Maryland would be financed by Norfolk Southern (perhaps in conjunction with other public sector sources), as would terminal construction in Mississippi, Georgia, Tennessee, Pennsylvania and New Jersey. These costs are estimated to be \$23 Million and \$130 Million respectively.
3. Capacity limitations on NS rail network, and expected traffic growth in carload segments preclude any significant volume of diversions in excess of those stated above, more so over a longer analysis period.

i The way most trucks are operated is with a single driver. The length of the work day for the single driver strongly influences how quickly standard truck shipments can be delivered, along with speed limits and some other factors. To say intermodal is competitive with single driver service means it can perform as well as the standard service offered by motor carriers.

ii Condensed from longer statements contained in the AASHTO Freight-Rail Bottom Line Report, pages 79-80, published in 2003.

iii These totals are developed using Reebie Associates Diversion Model and Transearch database. A comparison of overall volumes reveals that the Transearch data developed for this analysis captures an average of approximately 12,000 daily loaded movements on I-81 in Virginia (depending on location). The 1997 AADTT data supplied by VDOT through SJR-55 reflects an average daily truck volume of 9,444, a forecasted 2005 volume of 11,894, and a forecasted volume of 25,500 trucks in 2020 (over selected portions of the highway). The Virginia Roadside Survey of 2002 reported 10,059 trucks in both directions, and the VDOT 2002 loop counts report totals of approximately 13,197 daily trucks on I-81. Although originating from various sources, the numbers were judged in a sufficiently tight range for purposes of comparative analysis.

iv The Public Investment Scenarios reflect public sector funding of rail infrastructure improvements. These investments offset private-sector capital, and include the upgrading of right-of-way, the acquisition of more versatile intermodal equipment, and the expansion or new development of terminals. The Low and High cost sharing scenarios evaluated the impact of 20% and 25% market price savings respectively. These market price savings are assumed to be derived from the elimination of railroad-funded capital costs that are embedded in Long-Term-Variable (LTV) costs. A significant portion of the capital cost relief generated by public-sector investment is assumed to be passed through to the shipping public in the form of compelling cost reductions that in turn help drive modal conversion from highway to rail. In the Low Investment Case, railroad right-of-way and terminal expansion costs are assumed to be offset by public investment, and railroad right-of-way, terminal expansion and rolling stock costs in the High Case.