REEBIE

DRAFT

April 1, 2003

Mr. Ranjeet Rathore
VA Department of Rail & Public Transportation
1313 E. Main Street
Suite 300
Richmond VA 23218-0590

RE: Virginia Department of Rail and Public Transportation
RA Subcontract No. # 01.00.00188
Prime Contract No.# 505-03-CC0002

Dear Ranjeet:

Attached you will find the draft report dated March 31, 2003 for contract # 01.00.00188 for the **Northeast-Southeast-Midwest Corridor Paralleling I-81 & I-95 Marketing Study**. Enclosures include the following:

- 2 @ Bound Color Copies
- 1@ Unbound Color Copy

Should you have any questions, please do not hesitate to contact Mr. Jim Blair at (610) 566-4995. We look forward to continuing to work with you and your team towards the successful completion of this project.

Sincerely,

Cynthia S. Nash
Executive Secretary

Enclosure

2777 Summer Street, Suite 401 • Stamford, CT 06905-4310 • Tel. 203-705-0455 • Fax 203-705-0456

Northeast – Southeast – Midwest Corridor Paralleling I-81 & I-95 Marketing Study

Draft Report

Submitted to the Virginia Department of Rail and Public Transportation

March 31, 2003

By
Reebie Associates

In Cooperation With
Wilbur Smith Associates
Woodside Consulting Group
Atherton, Mease, & Company

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1 Background

Traditionally, most state transportation planning agencies, DOTs and MPOs have focused their infrastructure planning on highways and given less attention to other modes for possible investment, for the fundamental reason that they control investment in highways. However, there is a growing recognition that (a) more multi-modal public planning is needed for freight movement, (b) that such planning should include rail, air and water as well as highway options for freight movement, and (c) that freight planning, if done well, can help address a wide range of issues relating to industrial development, cargo security, highway congestion, transportation safety and air quality. For this integration of multi-modal planning to be accomplished, however, transportation planning agencies will need to identify key transportation planning issues and players, and to develop possible solutions to the problems of the present and the opportunities for the future.

The foundation of this Market Study is an overview of the current freight market environment. This data provides the origins and destinations of freight in Virginia, the quantity and commodity mix of that traffic, and the distribution of traffic between and within modes. The freight traffic data used in this report has been assembled using Reebie Associates' Year 1998 TRANSEARCH® database, adjusted for growth to reflect 2001 volumes. A complete description of TRANSEARCH, and the companion Intermodal Freight Visual Database (IFVDb) are located in **Appendix 1** to this document.

1.1 Freight Flows & Modal Distributions

Freight activity is comprised of local, regional and interregional movements. For this analysis, we focused on regional and interregional freight activity. There are other kinds of freight movement that this study does not directly address. Several examples are home delivery from retail establishments, building and equipment maintenance, lawn and grounds care, and insect control.

The purpose of analyzing freight flow data is to establish the basic characteristics of freight demand, its future and potential to shift, and its performance requirements. The data assembled for this analysis represents current freight volumes for the Commonwealth and surrounding regions. These data can be used by Virginia to:

- Locate infrastructure demand conflicts and economic development opportunities;
- Identify operational planning and cross-modal synchronization opportunities for the region;
- Determine the degree of jurisdictional coordination and control required to balance these demands.

For purposes of this analysis, we separated truck and rail freight traffic into three distinct buckets. These buckets were structured to address specific questions about the viability of transportation infrastructure investment and were maintained throughout the analysis. These segments are represented by the following:

Inbound Traffic – Traffic moving domestically FROM regions across the nation INTO specified counties in Virginia. The structure for this data is defined as a Business Economic Area (BEA) region as the origin, and a Virginia County [reported as a Federal Information Processing Standard (FIPS) code] as the destination. Volumes are reported in tons, for all truck modes [Truckload, Less-than-Truckload, and Private Truck]. The results of the inbound traffic analysis help to determine the size of the available local market, the depth and fit of the industrial sectors served by this freight transport activity, and the measure of growth or decline in freight activity – a measure of real transportation activity, and a proxy measure for industrial DEMAND.

Outbound Traffic – Traffic moving domestically TO regions across the nation FROM specified counties in Virginia. The structure for this data is defined as a Virginia County [reported as a Federal Information Processing Standard (FIPS) code] as the origin, and a Business Economic Area (BEA) region as the destination. Volumes are reported in tons, for all truck modes [Truckload, Less-than-Truckload, and Private Truck]. The results of the outbound traffic analysis help to determine the degree of "balance" available in the local market, the fit of the commodities shipped relative to the equipment made empty in the region, and the measure of growth or decline in freight activity – a measure of real transportation activity, and a proxy measure for industrial OUTPUT.

Through Traffic – Interregional traffic flows that move through the State without in-state processing, storage, or handling. Through traffic is that freight which consumes capacity on the regional infrastructure, but which does not generally provide local manufacturing employment. The structure for this data is defined as a Business Economic Area (BEA) as the origin, and a Business Economic Area (BEA) as the destination. Volumes are reported in tons, for all truck modes [Truckload, Less-than-Truckload, and Private Truck]. The results of the through traffic analysis help identify opportunities for commercial development and areas of excessive infrastructure demand. Through traffic is additive to inbound or outbound flows, depending on the direction of travel, and serves as a proxy measure for national economic activity.

Unusually, Virginia's total traffic base is balanced between originating, terminating and through traffic. By virtue of the extensive grid of Interstate Highways in the State, traffic flows from Miami, FL to Portland, ME or New York, NY to Mexico City, MX traverse the arteries of Virginia.

Also of interest is the relative balance of local traffic in the state. Indeed the inbound and outbound tonnage volumes are within fifteen percent of each other. This suggests that overall logistics costs in Virginia would be lower than average and that headhaul and backhaul truck rates approach parity.

Figure 1 outlines the distribution of traffic moving in the State, and portrays the sizable volume of through traffic relative to the balanced local volumes.

1.2 *Situation in the Corridor*

Truck traffic on Interstate 81 through Virginia is expected to grow by 90%[1] between 1998 and 2020. The Commonwealth is expecting to make significant investments to accommodate this traffic. However, there is reluctance to keep widening the highway if there are more cost effective, as well as environmentally friendly, alternatives. The General Assembly (through House Joint Resolution 704 and Senate Joint Resolution 55) has asked that alternative investments in intermodal facilities be investigated.

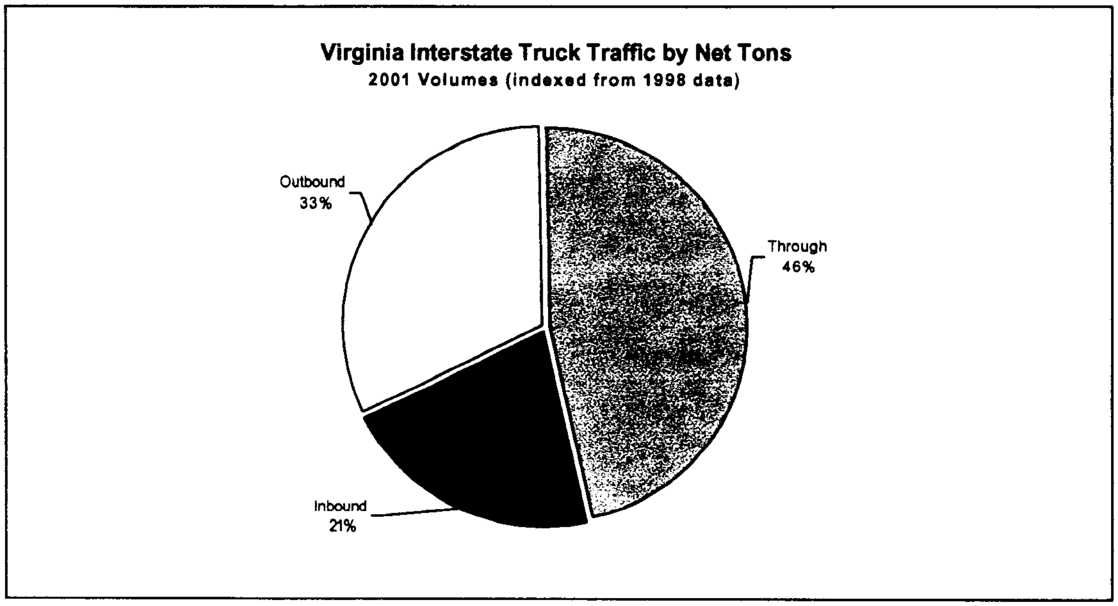

Figure 1

[1] Freight Analysis Framework

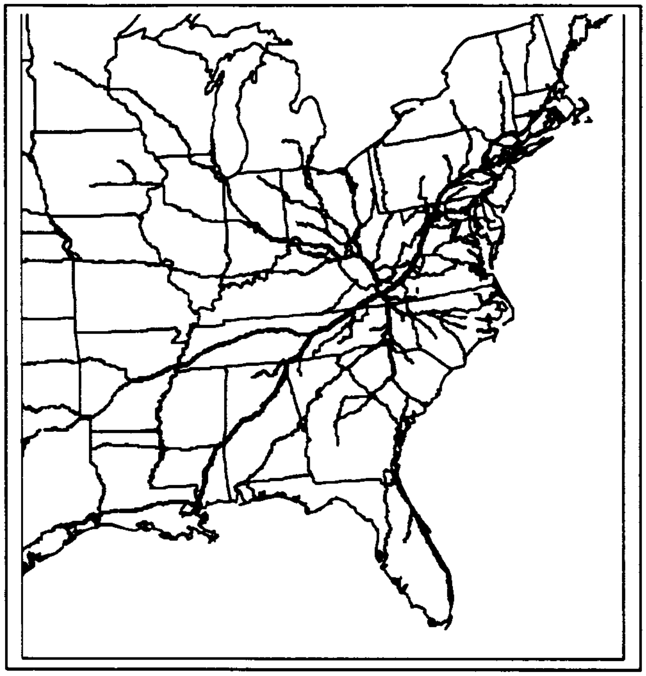

Figure 2

The primary mode for the movement of goods and services in the study corridors is truck. Vehicles range from long tractor-trailers hauling food from warehouses to high-volume grocers, to smaller, heavily laden dump trucks enroute to job sites, to light route trucks and step vans making twenty-five stops in a thirty-mile business pocket. They operate according to the schedules of their clientele, some in the late night and early morning, others throughout the work day. In almost all cases, they are striving to use time with a high degree of efficiency, and are balancing congestion, circuity, speed postings, toll costs, facility access, and other factors to achieve this. These trucks are the immediate conduits by which goods and services are supplied and distributed in the Virginia economy, supporting the indigenous population, businesses, institutions, and government.

Historically, intermodal transportation has not been a strong competitor in flows between the U. S. North and Southeast. A number of factors have contributed to this. Major Northeastern rail carriers primarily served east-west routes, and found it more profitable to use limited resources for those routes where their longer haul, coupled with greater densities- provided the highest efficiencies. The relatively uncongested north-south freeways offered greater access to competing trucks than the toll roads paralleling the east-west flows. For example, between Harrisburg and Chicago, intermodal share of the combined truck and intermodal market is 41%, while for the similar distance Harrisburg to Atlanta lane, intermodal only gets 5.3% of the volume.[2]

Thus, there is an implication that an under-served market exists in intermodal services. With the acquisition of Conrail by Norfolk Southern and CSX, there is now a greater potential to profitably serve this market. At the same time, increasing congestion, longer hauls (including a strong growth in international traffic), as well as market concentration

[2] BEA to BEA Flows, 2001 TRANSEARCH

may also push logistics choice towards intermodal. As the accompanying map makes plain[3], there are significant long-haul truck volumes using I-81 and its feeders.

The majority of this volume represents Dry-Van freight -- the type of traffic that is most competitive for intermodal transport. But the railroads operating in this region have admitted that their current intermodal service offerings have been unable to divert substantial volumes of highway freight. They are continuing to analyze what technologies and services will prove most attractive to the largest of the highway markets: trailer movements.

The current Northeast – Southeast – Midwest Corridor Marketing Study seeks to determine the marketplace demand for improved intermodal services, and the degree to which such services can divert highway traffic from these congested corridors.

1.2.1 Current Traffic Flows

Using TRANSEARCH data, we explored traffic moving along the segments representing the major highway corridors in Virginia. To do this, we queried the TRANSEARCH data using the Oak Ridge National Laboratory's (ORNL) highway routing model.

In 2001, Virginia's I-81 Corridor served as the gateway for over 2 million loads of freight. This represents approximately 0.05% of the total national truck freight. Over 48 % of the total traffic is through-traffic, neither originating nor terminating in Virginia. The 2001 I-81Corridor freight traffic is summarized in Figure 5 and shown on the highway network in Figure 2.

Distribution of 2001 Truck Tons (indexed from 1998) for Virginia

Direction	Net Tons	Loads	Share	Share
Through	103,226,134	5,161,745	46%	48%
Inbound	46,706,967	2,181,137	21%	20%
Outbound	72,631,711	3,371,287	33%	31%
Total	222,564,812	10,714,169	100%	100%

Figure 3

Much of the focus of the current analysis is the substantial volume of through traffic on the Commonwealth's major arteries. Figure 4 outlines the distribution of this "through" traffic by major commodity groupings. The diverse composition of this traffic suggests that traditional rail intermodal services will have only limited success in penetrating the market. Substantial volumes of bulk liquid, bulk solid and flatbed traffic moving through the state necessitate an analysis of unconventional intermodal products in an effort to increase the market base of traffic available for modal diversion.

[3] Domestic flows of 500 miles or more, using some of Interstate 81 in Virginia, routes with 1 million net tons annually or more, 2000 TRANSEARCH

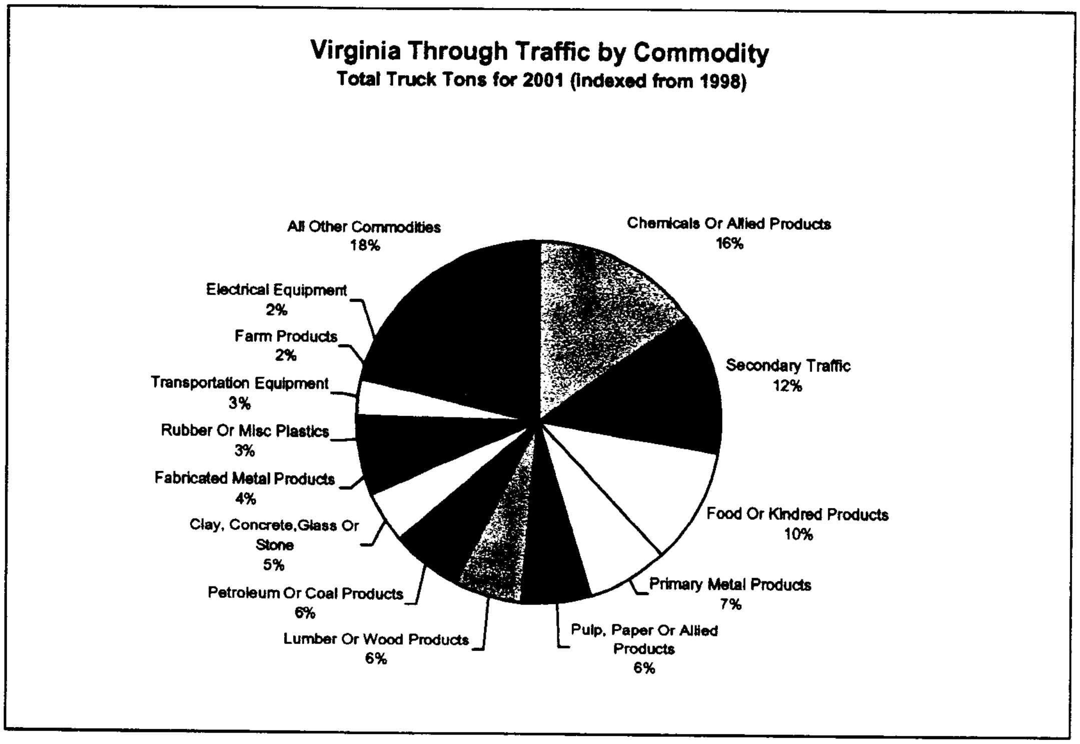

Figure 4

1.2.2 ***Primary Traffic Lanes***

The primary origin and destinations of I-81Corridor traffic are displayed on the next page, in Figure 5.

2001 Highest Volume Lanes – I-81 Traffic				
Origin	Destination	Annual Tons	Annual Loads	Cum. Pct of Loads
Roanoke, VA	Washington, DC	5,042,870	271,483	4.1%
Staunton, VA	Washington, DC	3,422,994	161,582	6.5%
New Orleans, LA	New York, NY	3,347,024	142,107	8.7%
Washington, DC	Roanoke, VA	2,727,023	136,422	10.7%
Houston, TX	New York, NY	2,724,352	120,586	12.6%
Baton Rouge, LA	New York, NY	2,659,193	115,358	14.3%
Los Angeles, CA	Staunton, VA	2,270,582	136,975	16.4%
Houston, TX	Philadelphia, PA	1,965,971	91,967	17.8%
Lexington, KY	Richmond, VA	1,878,710	77,381	18.9%
Roanoke, VA	Norfolk, VA	1,757,870	99,740	20.4%
Johnson, City, TN	Washington, DC	1,706,521	87,239	21.7%
Roanoke, VA	Richmond, VA	1,604,803	88,676	23.1%
Atlanta, GA	New York, NY	1,575,816	72,796	24.2%
Norfolk, VA	Roanoke, VA	1,507,132	78,506	25.4%
Lexington, KY	Norfolk, VA	1,409,772	61,421	26.3%
Dallas, TX	New York, NY	1,386,619	64,434	27.3%
New York, NY	Atlanta, GA	1,193,306	53,155	28.1%
Houston, TX	Boston, MA	1,135,683	48,646	28.8%
Washington, DC	Staunton, VA	1,113,939	53,964	29.6%
Richmond, VA	Roanoke, VA	1,085,264	51,290	30.4%
Total		**41,515,445**	**2,013,728**	

Figure 5

1.3 Prior Studies

To date, there have been two Commonwealth-sponsored studies to analyze the relationship between highway traffic and rail intermodal in Virginia. These are the Virginia Intermodal Feasibility Study conducted by Parsons Brinkerhoff, and the SJR-55 Study conducted by Wilbur Smith Associates (WSA) and Norfolk Southern Corporation (NS). In addition, other studies have analyzed regional issues that pertain to the current project. Among these is the Tennessee Study. The collective analysis contained in these studies suggests that the opportunity to divert long-haul truck traffic to rail intermodal would provide significant positive benefits to the Commonwealth. However, such a diversion could not be accomplished without substantial and costly upgrades to the parallel rail infrastructure.

From these studies two questions remain; (1) is there a marketplace demand for improved intermodal service in the corridor? and (2) what type of service offering will generate the greatest diversion benefit to the corridor? These questions represent the focus of the current Northeast – Southeast – Midwest Corridor Marketing Study.

1.3.1 ***HR-704***

The recent concentrated study of intermodal issues in Virginia springs from a Commonwealth of Virginia House Resolution 704 (HR-704), which sought to analyze rail alternatives to the increasing highway congestion on long-haul interstates. This resolution requested the Virginia Department of Transportation (VDOT) and the Virginia Department of Rail and Public Transportation (VDRPT) sponsor an analysis of rail intermodal facilities in the Commonwealth, and the regional demand for expanded intermodal capacity.

This first study commissioned by VDRPT and VDOT was executed by Parsons Brinkerhoff in June 2000, and identified all existing rail intermodal facilities in Virginia. This study also reported the volume of activity for each of these facilities, and an estimate of construction costs for new rail intermodal facilities. Using 1996 traffic data from Reebie Associates, and an algorithm-based routing model, the Parsons team analyzed freight traffic on Virginia's Interstates, and suggested that I-81 captures 52% of the long-haul truck movements moving through the State. Virginia's I-64 handles 35% of the Commonwealth's long haul traffic, while I-95 – predominantly a corridor for shorter-haul freight – handles 13%.

The Parsons analysis identified the following long-haul origin-destination pairs as having the highest volumes of traffic in the Commonwealth:

- Atlanta and New York and beyond to Boston
- Atlanta and the Philadelphia – Baltimore -- Washington DC
- New York and Miami
- New Orleans and New York
- Charlotte and Winston-Salem to New York

The results of the Parsons study were presented to the Virginia House of Representatives in House Document No. 23 – Desirability and Feasibility of Establishing Additional "Intermodal Transfer Facilities"; and concluded no new terminals were justified, but that the Commonwealth should encourage the development and expansion of intermodal services -- *including funding such expansion if necessary.* In addition, the study recommended a more thorough analysis of the potential for rail intermodal services to divert highway business.

1.3.2 ***SJR-55***

The follow-on analysis to the HR-704 study was sponsored through the Senate Joint Resolution 55. This resolution sought to build upon the results of the Parsons study by evaluating "the potential for shifting Virginia's highway traffic to railroads."[4] VDOT and VDRPT selected Wilbur Smith Associates to conduct this next analysis, focusing particular attention on the long-haul freight moving in the I-81 Corridor.

[4] SJR-55 Resolution as quoted in Senate Document 30.

This study utilized an updated (1998) database of freight flows and a series of Federally designed analysis tools to estimate the possible shift of highway traffic to an improved intermodal service product in the corridor.

This study contemplated two independent analyses, one conducted by the Wilbur Smith team, and the other by Norfolk Southern – the beneficial owner of a parallel rail route. The study employed the HERS[5] methodology to estimate benefits of $300 M - $1B to be derived from a modal shift of freight consistent with the diversion analyses.

1.3.2.1 *Potential for Diversions*

The Wilbur Smith study suggested that modal diversions to an improved intermodal product might be between 10% and 25% of the long-haul freight traffic in the I-81 Corridor. The NS Study concluded that between 2% and 27% of the long-haul freight might be diverted to an improved intermodal product. Both analyses suggested, however, that additional market data and analysis would be required to validate the accuracy of these estimates.

1.3.2.2 *Capital Improvements required for Rail Corridor*

The studies also analyzed the cost of improvements to the railroad infrastructure that might be required to provide a truck-competitive service in the corridor. These analyses concluded that approximately $2.3 B would be required to add capacity to the NS Shenandoah line. This amount included approximately $1.2 B in Virginia improvements alone. The studies suggested that an alternative routing via NS's Piedmont Line might be more cost effective, and should be the subject of an additional study.

1.3.2.3 *Recommendations from SJR-55*

The study concluded that the direct benefits of modal shift on the I-81 corridor were significant, and included a reduction in highway user costs, highway safety costs, pavement maintenance costs, and an improvement in air quality. The report suggested however, that the selected rail route alternative (Shenandoah Line) was an expensive and impractical approach to achieving the desired benefits.

The study also suggested that two follow-on studies be commissioned. The first should seek to refine the market areas and latent demand for the improved intermodal service. The second recommended study should perform a more detailed analysis of potential railway operating speeds, line capacities and schedule improvements associated with an improved service for the corridor.

The results of the Wilbur Smith study were reported to the Legislature in Senate Document No. 30 – The Potential for Shifting Virginia's Highway Traffic to Railroads. Acting on the recommendation of the SJR-55 analysis, the Commonwealth Legislature has commissioned a follow-on study to analyze the marketplace demand for an improved intermodal service product, and if sufficient interest is uncovered, a detailed analysis of the investments required to make the forecasted modal shifts a reality.

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[5] HERS – Highway Economic Requirement Systems

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1.3.3 Conclusions

Former Secretary of Transportation Shirley J. Ybarra, in her letter to former Governor James S. Gilmore in December 2000, cites that there are four reasons to revisit the previous I-81 Corridor analyses. These reasons include the following:

- Continuing business activity by Norfolk Southern or CSX
- Technological innovations in intermodal transportation
- A substantial change in economic behavior, or
- A change in federal or state legislative or regulatory policy

With the integration of Conrail by Norfolk Southern and CSXT complete and with service levels returning to pre-merger levels, the eastern carriers are again focusing attention on the issues of North-South markets. In addition, the recent MAROPS (Mid-Atlantic Rail Operations Study) analysis suggests that there is a building consensus on the need to expand eastern rail corridor capacities. Finally, the inability of rail carriers to expand domestic containerization has prompted a second look at innovative rail intermodal technologies as represented by Triple Crown's RoadRailer Service, and Canadian Pacific's Expressway product.

2 Purpose of the Market Study

2.1 Why a Market Analysis

The I-81 Corridor Case Study addresses an important set of issues in the Commonwealth's statewide planning. Is it possible, and feasible, to lessen the number of trucks traveling on the Interstate and the interconnecting routes? Is there a reasonable amount of traffic that could be diverted to rail to warrant a public investment in rail infrastructure and / or operations, or other incentives to shippers or rail carriers? Is this even an issue that can be controlled and managed within the geographic scope of the state borders of Virginia?

The answers to these questions are complex, and they begin with examination of the dynamics and composition of the market. Analysis of freight flow and performance requirements allows intelligent exploration of Corridor issues, and there are methods in place to help determine the steps to take to lessen the number of trucks traveling this route.

Given Virginia's stated objective to reduce the amount of highway congestion along I-81 and to seek alternative strategies for directing this traffic to rail transportation, the current profile of traffic in the Corridor becomes the basis of assessment for diversion estimates. As such, we have utilized freight traffic flow data to analyze the present mix of trucking on Interstate 81 and connecting corridors, in an effort to determine if the traffic exhibits characteristics favorable for diversion to rail transportation. Specifically, we have evaluated the freight volume with respect to four major characteristics that influence its divertibility. These are: (1) the origin, destination, and routing of traffic in relationship to serving facilities; (2) the density of traffic in lanes and operating paths; (3) the commodity and equipment mix; and (4) the total distance traveled.

2.2 Elements of the Analysis

With freight traffic flow information supplying a general foundation, there were three core elements in the market analysis:

- *Interviews & Surveys:* Primary market research was conducted among the freight users of the Virginia highway corridors. Users fell into two general categories: shippers whose goods travel in Virginia on their way to market, and motor carriers who serve such shippers. Each makes decisions that cause traffic to move by highway and could cause it to move by rail. Shippers do this by their control of modal use, and motor carriers by their choice to perform or purchase linehaul transportation. Decision-makers were identified and questioned by mail-back survey, by telephone, or by in-person interview about the potential for their use of rail intermodal services, and the performance characteristics required to attract their business.

- *Scenario Development:* Based on the findings from interviews and surveys, and on traffic flow data and the experience of railroad officials, a series of alternative railroad service designs were prepared. These designs included the introduction of new services and technology, and were associated with improvements to facilities and structures that would support higher quality operations. These improvements were calculated to raise railroad performance to levels sufficient for the diversion of traffic from highways.

- *Diversion Analysis:* Scenarios were translated into specific intermodal cost and service characteristics, for individual origin/destination traffic lanes that contribute to truck volume on Virginia highways. These performance characteristics were compared to those competitively available from all-highway operations, and lane by lane modal diversions estimated. The determination of diversion amounts was accomplished by use of a cross-elasticity model, informed and supported by the findings from interviews and surveys.

2.3 *Overview of Work Program*

The work breakdown for the analysis discussed above resulted in the definition of ten distinct tasks that were divided among team members according to skills and experience. Periodic review meeting and interim reports were identified in the work breakdown as an integral part of the process.

Before new research was performed, the consulting team undertook a series of steps were undertaken to examine previous work that had been identified as being relevant to the study. This review included the Tennessee Study among others.

Following the review process, time was allocated to conduct a series of railroad interviews: necessary to define the base line conditions and to understand any future plans for change and development.

The collection of the market data itself was determined to have several components. Tasks were included to produce a series of surveys and interviews of both shippers and motor carriers operating in the region. These surveys were designed to form the basis of the research. In each case, time was allotted to develop and test the survey questions, to identify the target recipients, to implement the surveys and the subsequent interviews, and to collect and analyze the responses.

The next step in the process was defined to be the actual modeling of the rail diversion potential, using both the results of the survey process and data available from Reebie Associates. The modeling required an iterative process that involved the team members in defining potential rail service offerings, testing the scenarios, and reviewing results.

The final steps of the work program included the process of reporting and reviewing the results, incorporating feedback and ideas, and the production of a comprehensive report as the final task in the process.

3 Data Collection

3.1 Surveys

3.1.1 Shipper Survey

3.1.1.1 Purpose

The shipper survey was designed to solicit information from individuals in the private sector who are responsible for making decisions about the shipment of goods into, out of, and through the Commonwealth of Virginia. As specified by the VDRPT, the universe of shippers was divided into three categories:

- Major national retail companies.
- Major national manufacturing companies.
- Major national freight consolidator companies.

The consultant team elected to solicit this information through the use of a mail-out, mail-back survey questionnaire. As explained in more detail below, the objective was to obtain the information from the top transportation/logistics officer of the targeted firms.

3.1.1.2 Goals of Survey

The shipper survey was designed to solicit information about:

- The amount of commodities being shipped through Virginia by major corridor and mode.
- Opinions about the rail intermodal mode.
- Criteria used to make shipping decisions.
- Trade-offs between shipping time and shipping costs.
- Criteria used to measure on-time performance.

3.1.1.3 Survey Methodology

The consultant was responsible for the identification of the top logistics managers for the following:

- 100 of the top 200 *Fortune 500* manufacturers,
- 12 of the top 20 *Fortune 500* retailers, and
- 15 of the top 20 freight consolidators.

These quotas were specified by the VDRPT.

The identification process consisted of the following steps:

1. Identification of firms comprising 150 percent of each requirement for the above listed categories.
2. Production of generic directories (including street address, web site, and telephone numbers) for the corporate headquarters of the firms identified in Step 1.
3. Identification of the top logistics managers of the firms identified in Step 1 by scanning their web sites and by calling the general corporate telephone numbers identified in Step 2.
4. Identification of the top logistics managers of some of the firms identified in Step 1 using the alternative methods described below.
5. Production of directories (including name, title, postal address, telephone, fax, and e-mail addresses) for the top logistics managers identified in either Step #3 or Step #4.
6. Follow-up gathering of contact information was performed by telephone with additional mailings.

Each step is described in more detail below.

3.1.1.3.1 Identification of Firms

The top *Fortune 500* manufacturers and retailers were identified by searching the *Fortune 500* web site. The top freight consolidators were identified from a *Directory of Logistic Providers* contained in the September 30, 2002 issue of Traffic World magazine.

3.1.1.3.2 Production of Corporate Directories

The generic directories for the manufacturers and retailers were compiled from a purchased Fortune 500 address list. The generic directory for the freight consolidators was derived from the Traffic World directory. The three directories were also supplemented by information compiled from Reebie's *Freight Locater* database. It provided information for six manufacturers, two retailers, and nine freight consolidators not found elsewhere.

3.1.1.3.3 Identification of Logistics Managers by Telephone

The consulting team scanned the web sites and called the general corporate telephone numbers of more than 100 of the firms identified in Step #1. A limited number of the corporate web sites provided useful information.

The identification of the logistics managers (particularly for the manufacturing firms) through telephone calls encountered obstacles such as:

Many of the firms have a corporate policy of not responding to any surveys.

Many calls were answered by voice-mail and requested return calls were not made.

In some cases, the firm did not move goods through, into, or out of Virginia and therefore declined to respond to the survey.

3.1.1.3.4 Identification of Logistics Managers by Other Means

In addition to identifying the top logistic mangers by telephone, other options were explored. These options included:

Searching the Internet for the sites of logistics and/or transportation organizations that might have readily accessible membership directories that could be perused for identification purposes.

Identifying logistics and/or transportation organizations that would be willing to sell their membership directory. It was discovered that many membership lists were not to be used as mailing lists or would not contain the information being sought. One sub-set was eventually purchased, providing additional, but limited contacts.

3.1.1.3.5 Production of Directories

Study team researchers compiled a directory (including name, title, postal address, telephone, fax, and e-mail address) of the top logistics managers identified in either Step 3.1.1.3.3 or 3.1.1.3.4. This directory was in turn used to generate letters transmitting the survey instrument to the top logistics managers, and then to transmit the survey package via fax or e-mail if such became necessary during the course of follow-up telephone calls.

3.1.1.3.6 Follow-up

A limited response rate to the initial mailing of survey packages indicated that additional follow-up would be required. Consultant staff therefore attempted to contact by telephone each of the individuals to whom the survey had been mailed. The purpose of the call was twofold: 1) to ascertain whether or not the survey package had indeed reached the person to whom it was addressed; and, if it had, 2) to determine whether or not the recipient had made progress on filling out the survey. In many instances, the intended recipient of the survey package indicated that he/she did not recall seeing it. In these cases, a survey package was sent by fax or by e-mail.

In an attempt to increase the response rate, another set of survey packages were mailed March 18, 2003 to an additional 40 firms with the letter of transmittal addressed to "Traffic Manger." Assistance was also requested from the Norfolk Southern Railway for help in identifying contacts for selected companies.

During the last half of March, a concentrated effort was made by telephone to solicit survey responses from individuals and firms to whom the survey had been previously sent. This also included calls to firms that had not previously received the survey package in the mail. Materials were forwarded to these firms by fax and by e-mail.

3.1.1.4 Summary

Using the processes described above, the top logistics managers of 75 firms were identified. Letters transmitting the survey instrument were specifically addressed to these individuals. Survey instruments with transmittal letters addressed to the "Director of Transportation/Logistics" were sent to an additional 112 firms for whom a specific individual had not been identified. The team's initial mailing therefore totaled 187 survey packages.

3.1.1.5 Survey Documents

As stated above, the consultant team elected to solicit appropriate information from major national retail, manufacturing and freight consolidators primarily through the use of a mail-out, mail-back survey questionnaire. The survey instrument was transmitted via a letter signed by the Secretary of the Virginia Department of Transportation, Whittington W. Clement. Recipients were asked to mail back the completed survey. The survey package included an addressed and postage paid return envelop for this purpose. The complete survey package can be seen in Appendix 7.

3.1.1.6 Collection of Results

As of March 27, 2003, the consultant had received 25 survey responses containing answers to some or all of the questions posed. The breakdown of the returned questionnaires by category of shipper is shown in Figure 6.

Number of Survey Responses Received by Category of Shipper **(as of March 27, 2003)**	
Category	**Number**
Retailing	4
Manufacturing	18
Freight Consolidator	3
Total	**25**

Figure 6

3.1.1.7 Results of Shipper Survey

The following discussion relates the findings from the Shipper Survey efforts in terms of what factors are important to these decision makers when choosing between rail intermodal options and all-highway alternatives. Moreover, it displays the range of factors, both positive and negative, and the consistency among respondents in placing importance on individual factors when making decisions.

The results demonstrate that speed and reliability of delivery are the most important requirements that must be present in order to allow for selection of intermodal options; while cost is the greatest incentive urging such decisions. That is, typically, a shipper will consider intermodal as a viable option if there is a price advantage versus all-highway --- provided that speed and reliability requirements can be met or approximated by the intermodal operators.

3.1.1.8 Self-selection Bias

The basis of survey sampling is randomization. Each person or event in the target population should have an equal probability of being selected and contributing information to the overall sample. Random selection of these equal probable events minimizes potential biases in the collected sample data.

Surveys that depend on the completion and return of a form are not random and are therefore subject to biases6. This form of bias is known as "self-selection." The conductors of the survey are not selecting the respondents, but instead the respondents are each making their own decision whether or not they will participate. This creates a division in the target population of those willing to participate and those unwilling to participate. The question then becomes whether or not this self-selection bias can lead to reliable results or conversely can render erroneous ones.

For the Virginia Intermodal Marketing Survey, the critical issue is whether or not this bias is related to potential use of rail intermodal services. If those choosing not to complete and return the survey are doing so because they have no interest in using rail, then gauging the potential for rail diversions from the completed surveys will overstate the estimates. If it should turn out that the self-selection bias is not related to potential use of rail service, then the sample will provide a good representation of potential rail usage. In an effort to understand the nature of the self-selection bias, the study team tabulated the results of follow-up discussions with a group of non-responders. The results are displayed in Figure 7.

Summary of Survey Turndowns

Category	Problem w/ Name or Address	No Explanation	No Surveys Policy	Little or No Facilities or Traffic in Virginia	Non-Asset Based Company	Total
Manufacturers	3	1	12	6	--	22
Retailers	--	1	1	1	--	3
Freight Consolidators	2	1	1	2	2	8
Total	**5**	**3**	**14**	**9**	**2**	**33**

Figure 7

6 The US Census is an exception to this rule since all residents are required by law to complete and return the Census form. The Census is a complete enumeration and not a survey.

Figure 7 Key:

- Problems w/ Name or Address – Survey packages returned because of incorrect name or address.
- No Explanation – Survey packages returned w/o explanation, or declined w/o explanation.
- No Surveys Policy – Corporate policy is to decline all survey requests.
- Little or No Facilities in Virginia – Shipper does little/no direct business in Virginia, or does not ship by truck through Virginia.
- Non-Asset Based Company – Freight consolidators who do not own trucks nor ship nor receive freight.

The most popular reason for refusing to complete the survey was a corporate wide no survey policy. The second most popular response was a lack of facilities and traffic in Virginia. None of the people interviewed listed lack of interest in rail as the primary reason for failure to respond to the survey. While this does not provide positive proof that the completed surveys are free of damaging biases, it does provide a higher level of confidence with the survey data.

3.2 Survey Results

This section contains a detailed description of the raw survey results; i.e., it follows the format of the original twelve questions contained in the survey form [see Appendix 7]. The survey respondents provided a good cross section of major national retail, manufacturing, and freight consolidation companies[7]. In total, the respondents contribute nearly 2,000 trucks per week and 100,000 trucks per year to Virginia's roadways.

Determining whether a shipper is willing to use rail intermodal services is in large part dependent on whether they manage the logistics or rely on a third party provider. The survey revealed that 61% of the respondents deal directly with the carriers and thus any decision to shift modes rests with the shipper [See Figure 8]. Approximately one-fourth of the respondents use an outside source for managing their logistics and are less concerned with the mode of travel. The 'Other' category included shippers managing their own private fleet of equipment, in which case modal diversion are unlikely; and shippers using a national bid system for selecting carriers.

[7] For confidentiality reasons all results are reported in aggregate.

Approach to Freight Transportation Decisions

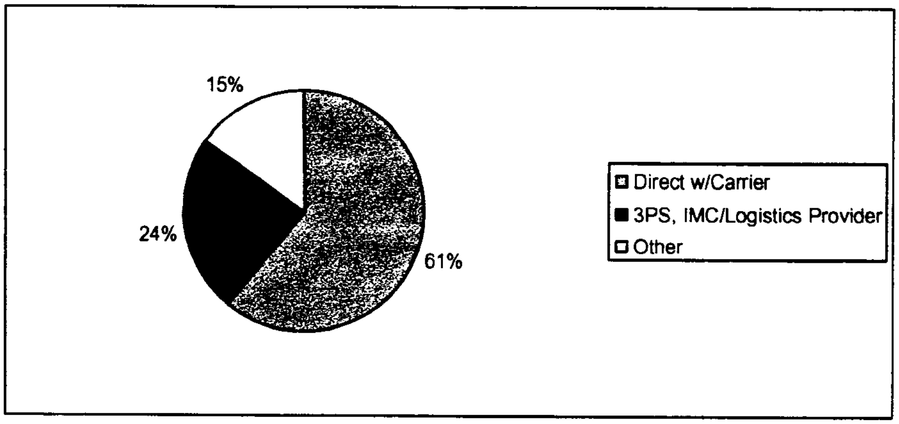

Figure 8

The 2,000 trucks per week contained in the survey responses are geographically dispersed and represent a mixture of long and short hauls moving in all directions. The commodity mixture includes: aluminum cans, glass bottles, clay and ceramic items, plywood, hydraulic equipment, lumber, paper, carpet, tires, beer, electronics, lubricants, auto parts, food, paint, and a host of other consumer goods and general merchandise shipments.

Two-thirds (67%) of the respondents rely entirely on trucking as their mode of transportation. The other third uses a mixture of rail and trucking, with rail usage ranging from 20% to 90% depending on the corridor, commodity, and company. The commodities moving by rail include clay and non-metallic minerals, carpet, tires, and some food and beverages.

The common perception is that rail is less expensive than truck, but it also provides less reliable service and longer transit times. The survey confirmed this perception as illustrated in Figure 9. Everyone completing this part of the survey stated that the advantage of rail intermodal over truck was 'cost.' The primary disadvantages were transit time and reliability, followed by more difficult to use, lack of accessibility, and increased loss and damage. Among specific problems with rail intermodal, transit time (speed) was the greatest; and other factors as identified by the survey respondents, include:

- Timing is not compatible with client requirements
- Too slow (compared to over-the-road trucking)
- Poor quality drayage at endpoints of the rail move
- Increased probability of damage

- Lack of consistent service (on time reliability)
- Closing of intermodal terminals
- Multiple carriers between west and east coasts
- Only provides savings for lanes greater than 1,000 miles
- No convenient service available (in certain lanes)

Rail Intermodal – Perceived Advantages and Disadvantages

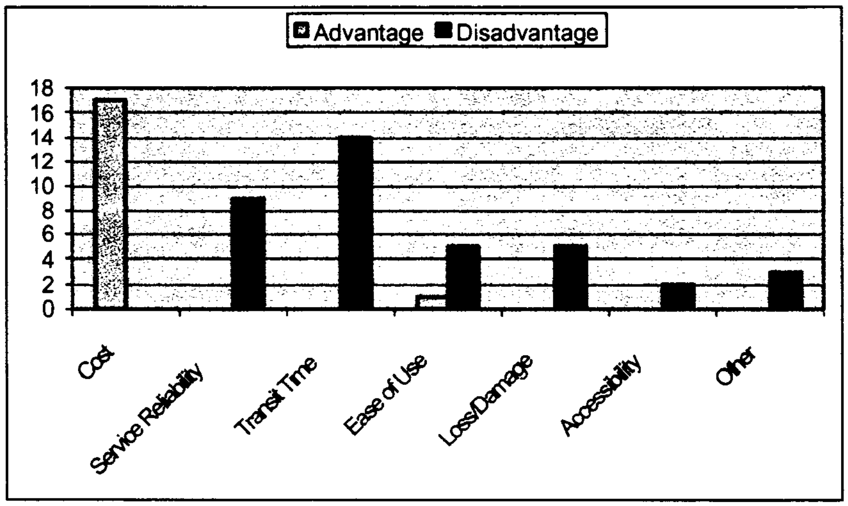

Figure 9

Selection of a freight carrier is based on many factors, as illustrated in Figure 10. Each survey respondent was asked to distribute 100% among the various decision factors, with a higher percentage being given to the more important factors. Figure 10 shows both the range of responses (vertical bars) and the average response (horizontal dash). *On-time performance* (a combination of *'speed'* and *'reliability'*) and *price* each accounted for 30% of the decision to use a specific freight carrier. *Transit time,* itself, accounted for 15%, indicating that it is a leading factor in any assessment, but different from *'reliability'* alone. There was evidence that when a shipper places 'reliability' as the most important factor, it is with an unstated understanding that absolute *'transit time'* (or schedule) must be within an acceptable envelope by comparison with over-the-road trucking alternatives. The remaining 25% were distributed among various other categories, such as *equipment type* and *supply, loss and damage records*, and *financial stability of the carrier.*

Freight Carrier Selection Criteria
(Vertical Bars Represent Range, Horizontal Dashes Represent Average Response)

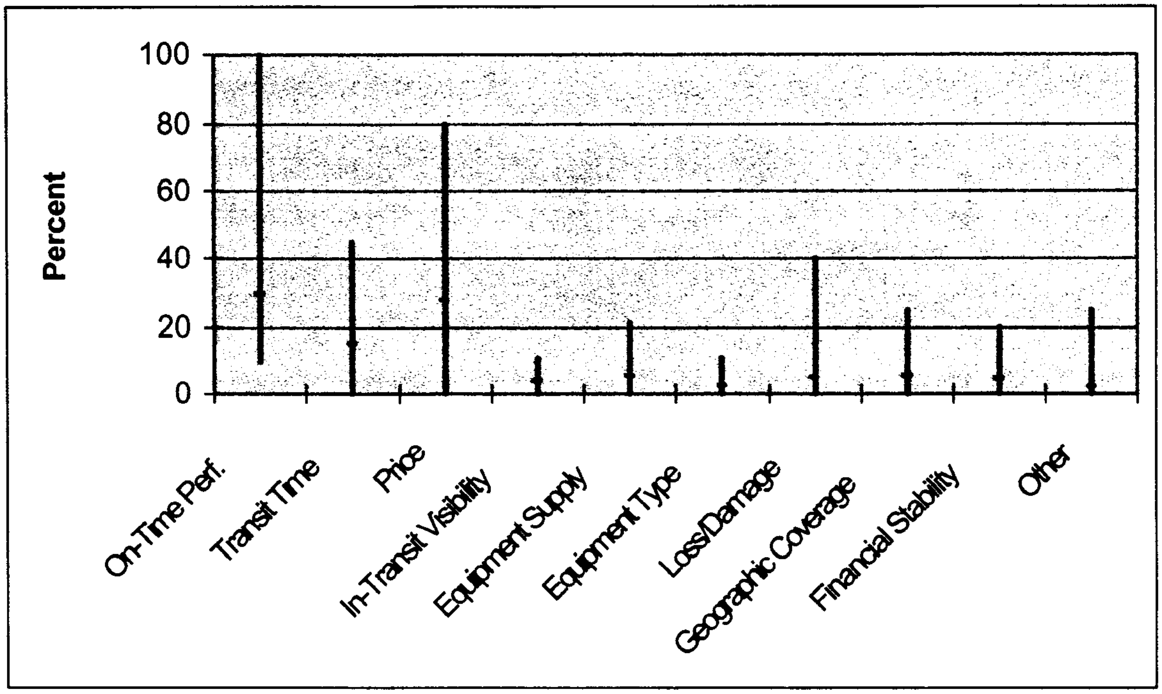

Figure 10

The next series of survey questions explores transit times. One-half of the responses to a question concerning changes in transit time and diversion of truck to rail intermodal, indicated that they would be willing to use rail if they could obtain the same transit time. This naturally led to an exploration of the relationship between transit time and transportation rates.

Figure 11 contains a graph depicting the trade-offs between transit time and rates. The shippers were asked to provide the rate reduction that would entice them into accepting an increase in transit time of 5%, 10%, and 25% respectively. The top line in Figure 11 shows that, on average, shippers expect a 10% rate reduction for a 5% transit time increase, a 15% rate reduction for a 10% transit time increase, and a 25% rate reduction for a 25% transit time increase. The bottom line shown in Figure 11 contains the opposite question: How much is a reduction in transit time worth? Despite the importance throughout the surveys on transit time, most shippers are not willing to increase rates to achieve a further reduction in time even though this could lead to a reduction in inventory carrying costs. In fact, only three respondents said they were willing to pay a premium for a 5% reduction in transit time. About half of the respondents stated that they were unwilling to increase rates regardless of the reduction in transit time.

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3.2.1 Sensitivity of Transit Time versus Rate

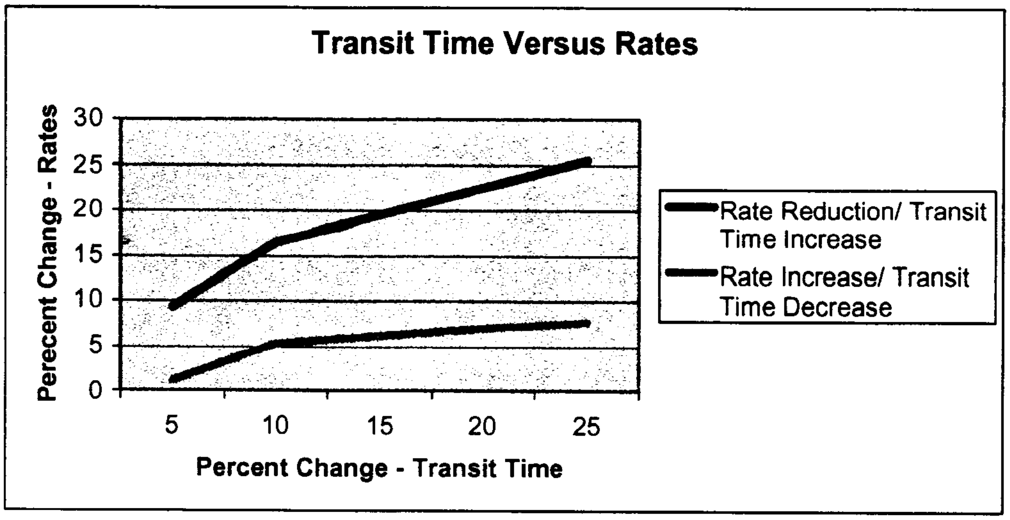


Figure 11

The results of a question linking the transit time/rate curves in Figure 11 with potential truck to rail diversions is contained in Figure 12. To step through an example, consider the row with a 5% increase in transit time and a 10% decrease in rate. The respondents indicated that they would be willing to divert 10% to 20% of existing truck traffic to rail under these conditions. Please keep in mind that not all respondents answered this question, nor did all respondents complete all parts of this question. In other words, Exhibit 6 does not attempt to address non-divertible traffic by interpreting blanks as zeros. What Figure 12 does show, is that for the segment of traffic susceptible to diversion8, there is a willingness to accept an increase in transit time if a reduction in transportation costs can be achieved. Exhibit 6 also shows a willingness to use rail if transit times can be reduced without a corresponding increase in rates. Railroads cannot expect to divert traffic from trucks by merely matching rates and transit time.

8 Traffic susceptible to diversion requires the right mixture of commodity and length of haul. Short haul, high value, time sensitive goods will not use rail regardless of the rates or transit times.

Truck to Rail Diversions Based on Transit Time and Rates

Change In Transit Time	Change In Rate	Truck to Rail Diversion (Low)	Truck to Rail Diversion (High)
Increase in Transit Time, Decrease in Rate			
25%	-10%	30%	30%
25%	-15%	5%	5%
25%	-20%	90%	90%
25%	-30%	50%	50%
25%	-40%	100%	100%
10%	-10%	5%	5%
10%	-20%	20%	25%
5%	-10%	10%	20%
Decrease in Transit Time, Increase in Rate			
-5%	0%	5%	40%
-10%	0%	30%	90%
-25%	0%	40%	90%
-25%	5%	20%	20%

Figure 12

Throughout the survey responses, the key factor for most shippers was *on-time performance.* The final three questions on the survey explore this issue by determining how on-time performance is measured, how sensitive the respondents really are to on-time performance, and what exactly is the meaning of on-time.

Figure 13 shows that most of the respondents depend on the carriers to provide the measurement of on-time performance and that they like to track every shipment. It is interesting to note that while some track only hot or problem shipments, every respondent is involved in some form of on-time performance tracking and measurement. This enforces the perception that *on-time performance* and *dependability* are the most important elements in selecting the carrier.

Measuring On-Time Performance

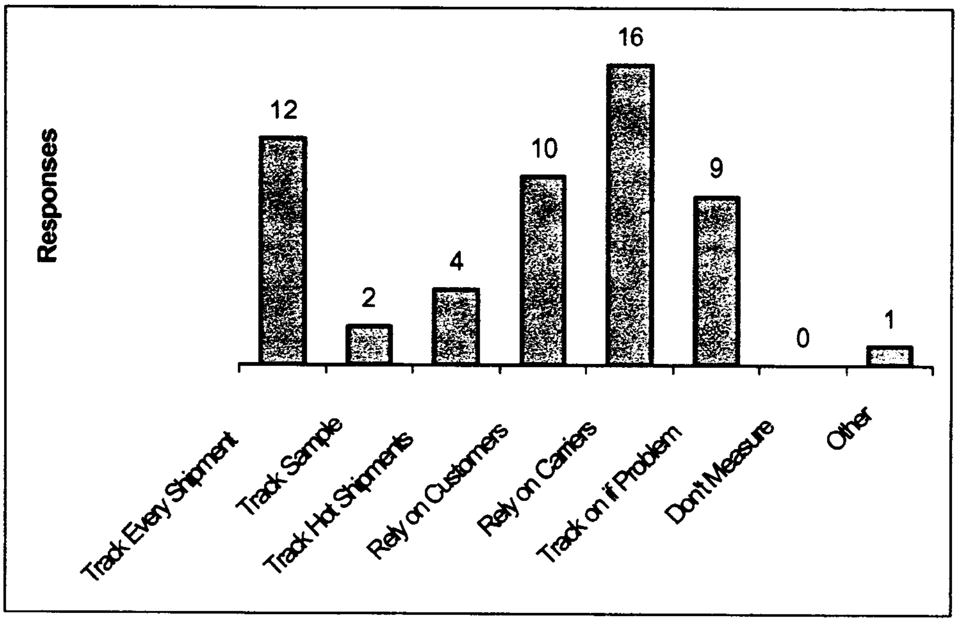


Figure 13

Figure 14 explores how sensitive the respondents are to on-time performance. Seventeen percent (17%) of the respondents are extremely sensitive to on-time performance and claim that they would be willing to switch carriers to achieve a 2% or less improvement in performance. This is very commodity specific, with food, fruit, and small packages being the most sensitive to performance changes. On the other end of the scale, 21% claimed that it would take a 10% or greater change in on-time performance to result in a change in carriers. These respondents were moving goods such as empty bottles and beverages.

On-Time Performance – Threshold for Shifting Carriers

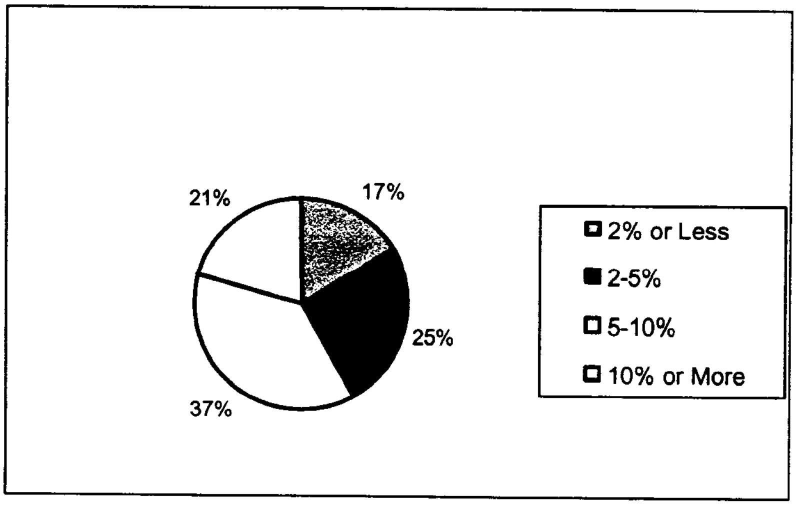


Figure 14

The final survey question attempts to better define the term "on-time". This was difficult for some of the respondents to answer since it varies with commodity and location. Some time windows were extremely tight with "on-time" being defined as no more than 15 minutes early and zero minutes late. About 25% of the respondents have no tolerance for shipments that are even one minute late. One average, a shipment is on-time if it is no more than seven hours early or three hours late. More than twelve hours early or eight hours late is considered unacceptable.

3.2.2 <u>*Motor Carrier Analysis*</u>

3.2.2.1 <u>*Background*</u>

To better understand the process and results of the motor carrier survey it is appropriate to offer some background information about the trucking industry in general and as it relates to the I-81 corridor. Trucking companies are divided into four basic types, truckload "for hire", private fleets operated by shippers, less-than-truckload (LTL), and package carriers. Examples in each category would be the fleets operated by J. B. Hunt, the Wal-Mart private fleet, Yellow Freight, and United Parcel Service. These carriers represent some of the largest of their type. There are many more small players in each category that transport the bulk of the freight in the country.

Carriers can operate in a nationwide market or they can focus their efforts on a regional or even a local area. There is a great deal of diversity in size, sophistication, and philosophy of operation. Conditions for truckers in these times are difficult. Rising fuel and insurance prices have forced many carriers, both large and small, from the market.

Many analysts believe that an improvement in the economy will cause serious shortages in the capacity to move freight throughout the country. These carriers are looking at ways to increase their operational effectiveness. Where intermodal opportunities offer a means to this end. These will be increased interest among some carriers in diversion opportunities.

At the other end of the spectrum are carriers choose to differentiate themselves in the market by not using intermodal service. They believe that this gives them an advantage among certain shippers. This belief is based on perceptions they have regarding past intermodal performance -- issues involving reliability of service, damage to cargo, and lengthy transit times.

For other carriers, size may be the factor that limits or excludes their use of intermodal service. A certain size of infrastructure is required to manage a traditional intermodal shipment. Connections at both ends of the shipment are necessary to arrange the dray movement to the railhead as well as the connections to manage the pricing and scheduling for the rail portion of the movement. For very small carriers this type of knowledge and infrastructure is beyond their capabilities and so most do not even consider intermodal options.

In order to move a shipment via rail, the carrier must have access to the appropriate equipment. If their own equipment is to be used, it must be structurally suitable and they must have enough extra to allow for continuing operation during the time that the trailer is on the rail. Carriers operating consistently in an intermodal market with their own equipment carry a larger trailer to tractor ratio than those that do not. This additional expense may keep some carriers out of the intermodal market. The choice to use rail owned equipment may be available but again, the internal infrastructure must be present to take advantage of that option.

Equipment type and balance play a large role in a company's intermodal decisions. Motor carriers use a combination of equipment including spring-ride trailers, air ride trailers, and intermodal containers. To be used for intermodal service a trailer must be equipped to withstand the vertical lift on to the rail car. In general, a spring-ride, lift bed trailer is required for intermodal operation. Some equipment is reinforced to allow top lifting. If a fleet has standardized with the type of trailer that can be lifted, then any load can be moved by truck or as an intermodal shipment. For these carriers, the choice of mode becomes independent of the equipment. For fleets that have mixed equipment composition, spring-ride, air-ride, and/or containers, the mode choice is not independent. The carrier must be sure that the empty box for the load supports the choice of loaded movement mode.

When equipment type enters the decision making process, then balance becomes important. Given a limited number of assets, the carrier needs to be concerned with keeping those assets in areas where they can continue to move and not be idled by the lack of appropriate loads. In the case of the I-81 market, the Northeast is heavily consumer based and there is much more inbound traffic from the south than outbound. For a carrier working to balance traffic, the outbound flow from the Northeast becomes the limiting factor.

Some carriers move their equipment in a three-step process known as triangulation. The general flow is from the Southeast to the Northeast to the Midwest and back to the Southeast. If a carrier does not control intermodal eligible freight in all three of the lanes then the lane with the smallest intermodal potential becomes the limiting factor Market Segmentation.

The discussion above points out the ways that access to equipment, infrastructure, and knowledge may impact a carrier's ability to utilize rail service as part of its operation. Clearly carrier size influences the market potential for rail diversion. What follows is a description of four size groupings that are representative of the carriers operating throughout the country and more importantly, through the state of Virginia.

3.2.2.1.1 Super Carrier

In the motor carrier industry there are a handful of carriers that can be categorized as super in each of the groups, truckload, LTL, and package providers. The fleet strength for these carriers is greater than three thousand operating units with trailers or containers numbering in the ten to twenty thousand range. These fleets are nationwide in scope, operating with company equipment and independent owner operators under exclusive lease. Their operations include large logistics entities that act as third party providers in the market. They are heavily dependent on technology and have the most highly developed systems, tracking, and operational processes. They often use other carriers to substitute service for their clients. The bulk of these super carriers have extensive intermodal operations that have consumed a large portion of the long haul intermodal traffic in the country.

The support staff in these carriers is large, extensively trained, and savvy regarding all possible methods of moving freight in the most cost effective and service oriented fashion.

The customer base is predominantly Fortune 500 and their capacity is committed by extensive multi-year contracts. There is one carrier in this group whose strategy is to sell through independent agents and focus on freight in smaller, more diverse markets. Nevertheless, its operations and use of intermodal service is similar.

Among these super carriers there are disparate strategies regarding their intermodal equipment that affects their use of intermodal service and the subsequent flexibility of their programs for additional diversion. They may have standardized the fleet on a spring ride, lift capable trailer that moves equally well by truck or rail. This makes their intermodal operation more flexible, but may exclude them from certain commodity groups where air ride equipment is desirable. Another carrier may have a fleet mix containing containers, air ride trailers, and spring ride trailers. These carriers may have a more diverse commodity base but issues of equipment balance restrict their intermodal operations. Another of the carriers in this classification utilizes only rail trailers and containers in its intermodal program so the issues of balance are non-existent for them, but they depend on rail balance for availability of equipment.

The carriers in this group that operate truckload fleets have an impact on less than 5% of the total truckload market. However, that 5% is of considerable size. Among this group, truckload, LTL, and package, there is significant opportunity for additional diversion, particularly with a product that will work in the shorter haul markets.

3.2.2.1.2 Large Fleet

Carriers in this category have more than three hundred power units. Generally their operations are national in scope, and the operating companies own new and late model equipment that is well maintained. This group of carriers will have a presence in most major metropolitan areas. Their drivers are most often company employees, although independent operators are not uncommon. The fleet may consist of both long haul and regional elements. Fleets will utilize information technology including weigh in motion, electronic toll, GPS, in-cab communications and others. Fleets are likely already involved in some use of intermodal service. Among this group of carriers are fleets that choose not to use intermodal service as a way to distinguish themselves in the marketplace.

These fleets have large support staff personnel with considerable analytical capability. Support staff will be familiar with intermodal operations and be able to accurately assess economic components of the intermodal decision.

The customer base in these fleets will consist largely of Fortune 500 companies. A large percentage of the traffic is made-up of repetitive flows. Much of the freight activity will be under contract and may be lane specific. Fleets will also provide extensive logistics services to specific clients as well as for-hire transportation services.

3.2.2.1.3 Mid-Size Fleet

A fleet in this category operates between twenty-five and 300 power units. They may be national in operating scope or region specific. The carrier will be present in some major metropolitan areas, but not all. The driver force is likely a mix of company drivers and independent operators under contract to the carrier. Equipment will be a mix of new, late mode and used. The company will own equipment as well as lease equipment from others. Some fleet will have and use various pieces of technology while others may not. While some fleets of this size may be familiar with and take advantage of intermodal opportunities, most will not.

The support staff in these organizations is likely to be small, affecting only the fundamental needs of the operation.

The customer base may include Fortune 500 companies, as well as many smaller shippers. Some work will be under contract, while a considerable amount will happen in what is considered a "spot" market. These fleets are likely to use third party providers to marry with their customers, to enable them to move about their areas in a balanced fashion. Many private fleets operated by shippers would fit into this category. There is considerable opportunity to expand intermodal use in this group if a product is introduced that meets their needs and can be promoted in a manner that makes it attractive.

3.2.2.1.4 Small Fleet

A small fleet has less than twenty-five power units. Many of these fleets have fewer than five trucks. They are primarily independent owner operators and they tend to focus on niche markets, whether regional, commodity, or shipper based. The scope of operations may be nationwide but are more often regional or local in nature. These fleets may employ company drivers or they may be a conglomerate of several owner operators, often family groups. Equipment may be new, late model or used and old. Some fleets may have access to certain technology but more likely they do not. There is little use of intermodal opportunities, as they do not have the infrastructure to support arranging the dray and the rail transportation.

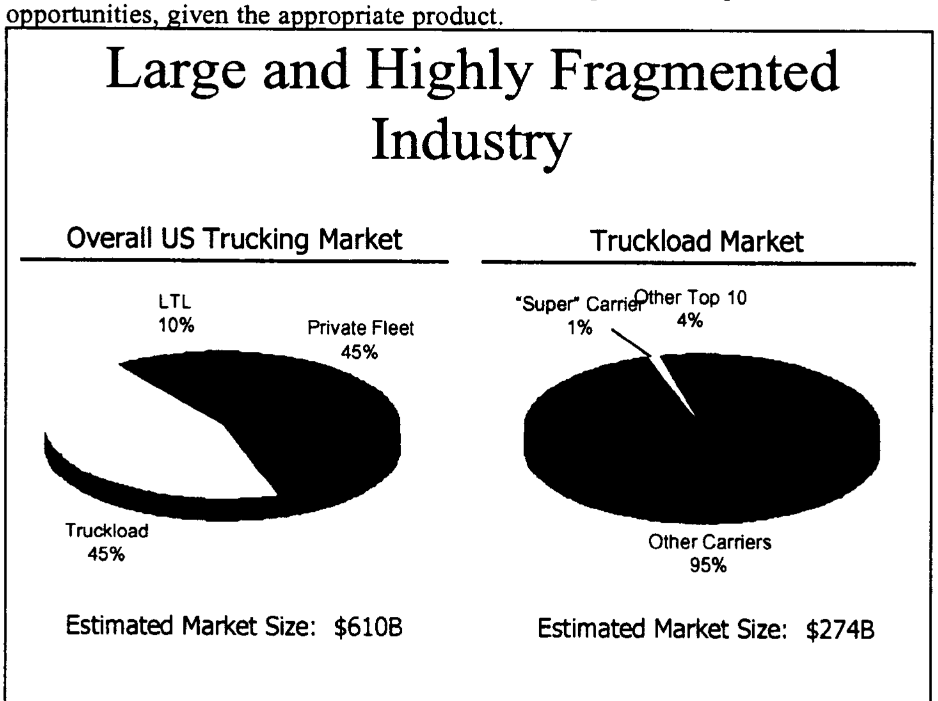
The support staff is very small or does not exist. Personnel are largely focused on finding traffic to fill the trucks and match the balance needs of their network of operations.

The customer base may consist of one or several "anchor" accounts and various relationships with third party providers, including other larger fleets, for whom they provide substitute power.

The carriers in this group are the least likely to use intermodal services and yet the amount of traffic they control, and thus their diversion potential, is significant. The challenge is to provide a service that will be flexible enough for their use and to promote it to them in a way that makes it financially attractive.

3.2.2.2 <u>Conclusions</u>

Figure 15 indicates that those carriers in the super category, while controlling a vast amount of freight, actually represent only a small percentage of the total truckload market. While these carriers offer the best opportunity for diversion, they have already converted a significant portion of their traffic. What remains is traffic in a shorter-haul, more specialized market. The service and price demands in this carrier group will be high. Much smaller carriers move the bulk of the freight in the truckload segment. These carriers have varying levels of sophistication and intermodal interest. Products that appeal to this group will need to be flexible and vastly different from the more traditional offerings. The super carrier dominates more of the LTL and package traffic but there still exists a group of mid-size players that could have significant impact on diversion opportunities, given the appropriate product.



Source: American Trucking Association and company public filings.

Figure 15

3.2.2.3 <u>VDOT Roadside Survey Data</u>

3.2.2.3.1 Percentage Trucks

Given the composition of motor carriers in the two corridors, the consultant team sought to determine what potential existed for rail intermodal diversion from the various segments of traffic on the highway.

The VDOT Roadside survey provided the basis for an analysis of the fleet size make-up for the carriers traveling the corridors. Fleet size is a key factor in determining the likelihood of a carrier's ability to utilize available or proposed intermodal options. The relative likelihood or potential of intermodal use is addressed in more detail in Section 3.2.2.1.

Among the companies observed in the VDOT Roadside survey, the following was noted relative to fleet size. Nearly 28% of the fleets fell into the "large" or "super" categories, almost 14% of the fleets were "mid-sized" and 58% were classified as "small". When the survey is looked at from the perspective of actual presence (number of individual sighting) in the corridor the super and "large" fleets make up the majority of the count.

The composition of the fleets observed in the corridors was made up primarily of truckload, both dry van and refrigerated, less-than-truckload, express/package, tank and auto-rack. Dry van truckload carriers made up the single largest component followed by less-than-truckload, and express/package carriers. The survey identified a number of local fleets, including LTL and express/package city delivery units, and regional distribution including dry goods, oil, grocery, and drug. There is little likelihood that this traffic can be diverted to rail. Miners Fuel, CVS Drug, Giant Foods, Averitt Express, UPS and Wal-Mart are some examples of local fleet operations observed. The percentage of trucks for I-81 and I-95 are shown in Figure 16 and Figure 17.

3.2.2.3.2 Time of Day Distribution

Truck volumes fluctuate widely across the 24 hour time frame. Observations recorded at Dumfries VA indicate that hourly truck counts are highest between 9:00AM and 2:00PM, drop off between 3:00PM and 6:00PM and then rebound between 7:00PM and 9:00PM. As a percentage of total vehicular traffic, truck volumes represent approximately 30% of the traffic between midnight and 3:00AM. Between 6:00AM and 7:00PM trucks represent less than 10% of the total traffic. The proximity of the Washington DC metro area may be influencing this pattern. The observations recorded at Troutville are similar in some ways to those of Dumfries. Hourly truck counts are high beginning about 9:00AM and remain steady throughout the day beginning a decline after 6:00PM. Much like Dumfries, Troutville recorded the highest percentage of trucks to total vehicles between midnight and 5:00AM. Approximately 50% of the total traffic during this period is truck. During the 6:00AM to 7:00PM time frame trucks make up less than 20% of the total traffic observed. Unlike the two periods of high truck counts observed at Dumfries, the steady daytime Troutville truck count suggests more through traffic verses traffic more local in nature at Dumfries. The distribution of truck traffic on the I-81 and I-95 Corridors by time of day is shown in Figure 18 and Figure 19.

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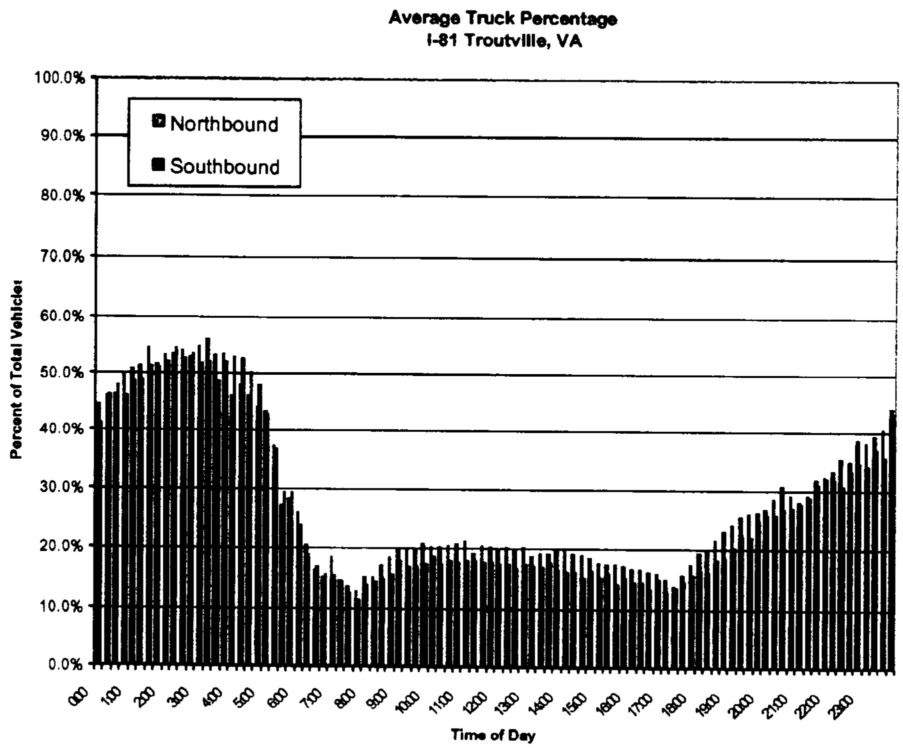


Figure 16

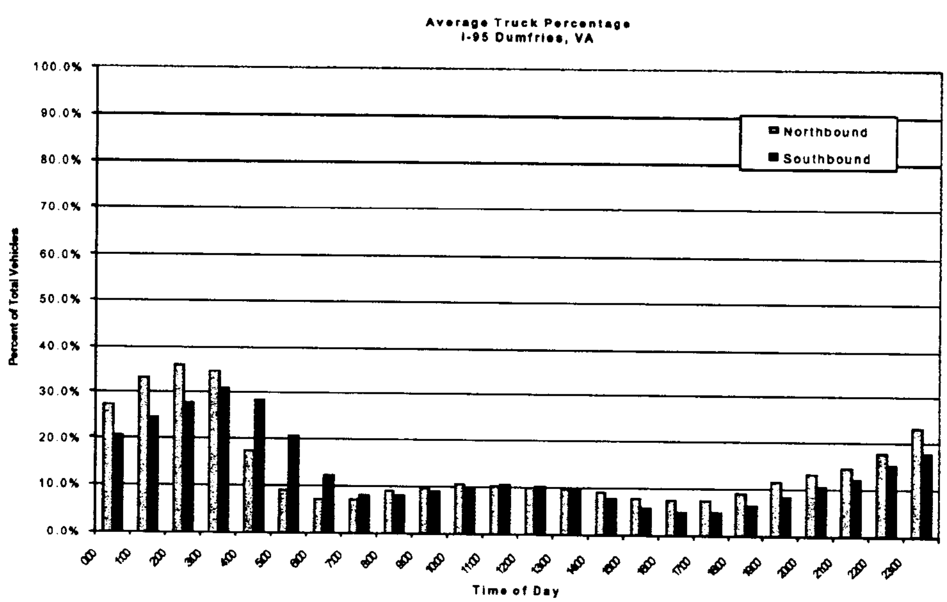


Figure 17

Average Hourly Daily Truck Volumes
I-81 Troutville, VA

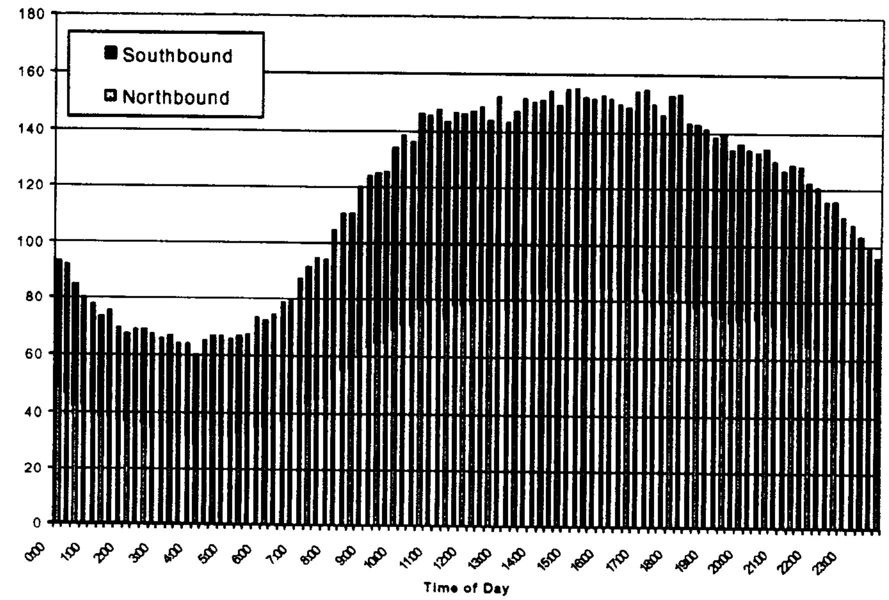


Figure 18

Average Hourly Distribution of Trucks
I-95 Dumfries, VA

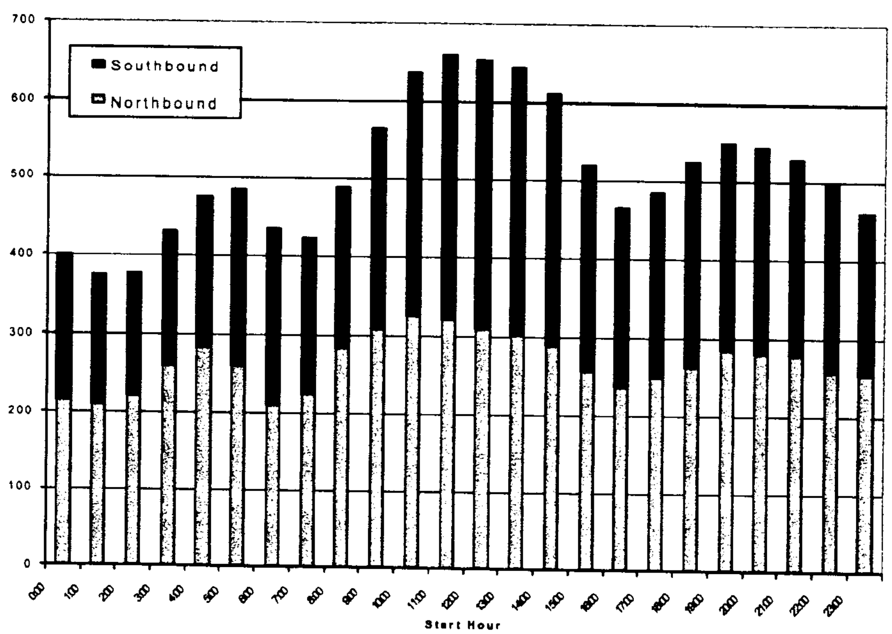


Figure 19

3.2.2.3.3 Volume of Freight

From a combination of results carrier survey, the interviews and by using TRANSEARCH freight flow data, the consultant team was able to determine that the majority of the potentially divertible truck traffic fell into two general categories. Lanes providing more traditional intermodal opportunities, moving between Texas and the Southwest to the Northeast offered sizable potential for diversion. In lanes generally not targeted by railroads due to length of haul issues, Georgia, North and South Carolina and eastern Tennessee to and from New England, New York and Pennsylvania provide desirable levels of density. One super carrier reported a count of approximately 40,000 load annually moving north and south in this shorter haul lane. If the 16-20% diversion statistic were to hold, the result would be about 16,000 shipments. In addition to this volume however, the super carrier also reported there was considerably more traffic to be had in this category, traffic they had "walked away from" previously. Should a suitable intermodal service develop, the company would be again seeking this traffic. A carrier of this stature has the ability to attract a certain amount of traffic just by virtue of its interest. There is every reason to believe that the other carriers in the super category could report similar numbers.

3.2.2.3.4 Conclusions

Based on the market segmentation by carrier size and given the fact that the super carriers move a significant portion of traffic via rail intermodal already, the team believes the highest potential for diversion exists with those carriers in the large and mid-size categories. There is little to influence movement in the small segment and the super carriers with their high level of sophistication will jump at good opportunities when they are presented. The super carriers do still have traffic to convert in significant volumes, but overall, a larger portion of the market rests in the hands of the two middle classifications. Efforts to design and market a new product should be focused on these two groups.

3.2.2.4 Motor Carrier Survey

3.2.2.4.1 Purpose

The purpose of this task was to obtain specific information from the providers of freight transportation services in the study area, through the use of a survey and related interviews. This survey process has helped to ground the study with a practical review of market behavior and needs. This has sharpened the identification of available traffic and guided the analysis of diversion.

3.2.2.4.2 Goals of Survey

The survey was designed to collect information regarding the potential for increased diversion of truck traffic to rail and to determine the conditions that were necessary to achieve this additional diversion. Motor carriers were asked to supply information about their shipments, their current intermodal operations, their knowledge of new intermodal products and technologies and finally their priorities for moving traffic to the rail.

3.2.2.4.3 Survey Methodology

Atherton, Mease, & Company developed the survey form and the questions were presented and tested in an interview with J. B. Hunt Transport. Following this interview and consultation with the project team, some minor changes were made to the form. The target list of carriers was identified using the carrier list developed by the Virginia Department of Transportation weigh station studies. Specific management individuals were identified at each carrier to be recipients of the survey. Surveys were sent to these individuals with cover letters from the state and from the project team. Certain carriers were targeted for personal interviews. Atherton, Mease, & Company, along with Reebie Associates, has conducted these interviews over the past month.

3.2.2.4.4 Survey Documents

Copies of the motor carrier survey documents are contained in **Appendix 6** of this Report.

3.2.2.4.5 Collection of Results

Results were captured in three ways. Survey documents were returned to the Reebie office by fax or by mail. On-site interviews were conducted at some carrier locations, and certain carriers were interviewed by phone. All of the interview notes and the survey documents were forwarded to Atherton, Mease, & Company for review and compilation.

3.2.2.4.6 Compilation of Results

At the time of this writing, survey documents have been received from six participants. Interviews were completed with fourteen carriers. Information collected from the interviews is significant to the study but may not fit exactly the form of the survey questions. Specific shipment volumes were omitted in some cases. Because the replies were not consistent in each case, statistical evaluation of the survey results is not possible. The results thus far are outlined in the order of the questions below. Some carriers are still expected to contribute information. That data will be incorporated to later versions of this report.

3.2.2.4.7 Survey Questions and Response Summary

Most of the survey responses were in the super carrier category. The issues presented have relevance to carriers in the other size groupings. Some of the smaller carriers in the survey do not use intermodal services at all. Some were considering the change and some had no intention of moving in this direction.

Respondents reported their annual loads moved in a range from a low in the low thousands to a high of over two million. The percentage of intermodal loads, when compared to the total, varied from 16% to 75%. The highest was reported by the one IMC responding to the survey.

The length of haul (LOH) reported for truck shipments was between 360 and 900 miles for those respondents with both truck and intermodal service. The intermodal length of haul was between 1200 and 2000 miles, reflecting the larger diversion in what have traditionally been intermodal markets.

The LOH below which intermodal transit is currently considered impractical was consistently reported in the 600 to 700 mile range. One carrier did go as low as 300 miles based on its successful use of the Florida East Coast Service from Jacksonville to Miami.

Most respondents reported an allowable circuity of 10-12% in their intermodal operations. Circuity is defined as the excess miles caused by the dray movements and by the rail routing when compared to the highway routing from origin to destination.

The expenses for moving a shipment to the rail yard varied considerably. Dray costs reported ranged from $1.20 to $2.50 per mile. This range reflects a dependence on the length of haul in the dray area, shorter moves being more expensive on a per mile basis.

Truck movements in and out of Virginia were largely balanced. This balance exists because carriers are reluctant to send trucks into an area where they don't have a corresponding outbound load. On the intermodal side however, the state is heavily inbound. The excess intermodal equipment is moved out empty to reposition to a more favorable area.

The Northeast is largely a consumer population and has traditionally been and remains a heavily inbound area for freight. One respondent did report more intermodal traffic out of the northeast to the southeast but this was the exception.

More loads moved by rail from the Southwest to the Northeast than move in the opposite direction but the lane is still predominantly truck oriented.

The rail ramps cited by the carriers as most often used were:

- Jacksonville, FL
- Atlanta, GA (Hulsey & Inman)
- New Orleans, LA
- Charlotte, NC
- Portsmouth, VA
- Memphis, TN
- Alexandria, VA

A series of questions were designed to elicit the factors that prevented carriers from using intermodal options in their operations. The answers consistently included price, transit time, reliability of service, and length of haul. Carriers clearly felt that the overall cost of an intermodal shipment had to be less that the comparable truck movement. The transit time needed to equal the same transit that could be achieved with a single driver from origin to destination. The service reliability needed to be equivalent to the expectations for truck deliveries, currently in the 98% on time range. The final determining factor was whether the overall length of haul on the shipment passed the threshold that the carrier had set for its cut off for intermodal operations.

In the area of specific highways traveled, the response was mixed. Some carriers make more use of I-81 and some I-95. No specific mileages were reported. The differences in the highway use are related to the geographic customer base, east versus west. Very few carriers had any comment about the use of route 29. The assumption is that 29 is not used heavily as a through route.

All of the respondents were familiar with RoadRailer and expressed an interest in using it if the equipment were made available to them from an outside party. Most were familiar with the Expressway product as it is used in Canada and had interest in using it in the shorter haul market with price, transit time, and reliability being the determining factors. No one was familiar with the "ferry boat" concept as the roll-on roll-off rail equipment used in Europe is called. In the interviews it was difficult for carriers to envision this concept and how it might be used in their operations.

In order for a new intermodal service to be attractive enough to cause diversion it must be competitive with transit time offered by a truck with a single driver. The frequency of departure must be such that dwell time at the ramp is minimal, relating also to maintaining the transit time. The service reliability must support what truckers offer to their customers, 95% at a minimum and more reasonably in the 98% range. The expectation on price was that it would offer a savings from the costs of a pure truck shipment. There was also considerable discussion regarding the level of customer service, particularly as it related to tracing and notification of delays.

The carriers with an interest in intermodal operations indicated they would welcome a service in the 600 to 900 mile length of haul range if that service met the criteria discussed above. They also felt that more frequent rail departures would help facilitate diversion in both this shorter haul market and in some of the more traditional lanes.

Equipment balance has a moderate effect on the decision to move a shipment via the rail. No one reported balance as the most or least critical factor in their process.

3.2.2.4.8 Conclusions

The motor carriers included in this study fit a variety of classifications. They comprised the nation's largest truckload, less-than-truckload, and package carriers, all with established intermodal programs. There were smaller carriers moving some traffic on the rail, and others who were not using intermodal at all and who choose to distinguish themselves in that fashion.

Each carrier identified that they had freight that could be converted, largely in two different categories.

The first group included traffic from the southwest -- Texas, Louisiana, and Mexico -- going to the northeast. This traffic fits a traditional intermodal length of haul. However, there isn't a product offered by the rails that can compete with the truck transit in the lane. All rail traffic in the corridors is routed to Chicago and then east, which requires additional time and adds circuitry that is unacceptable to the carrier. If a product were developed moving at single driver truck transit directly through the south to the northeast, the carriers with existing intermodal operations would use the service.

The second group of traffic runs between the southeast and the northeast and is in a length of haul that is shorter than that of a traditional intermodal shipment. A great deal of this traffic can be defined as "tweeners", shipments in the 600 to 900 mile range that require more than one transit day by truck but slightly less than two days. There is also some traffic in the single day range of 500 miles. For the traffic in this shorter length of haul category to be converted, the rail service must provide a transit time door-to-door that is equivalent to that achieved by a truck with a single driver. This has implications for three factors, ramp proximity and efficiency, rail speed, and frequency of service.

The most important determinant to attract traffic to an intermodal product is the provision of single driver transit time. That is equivalent to the time required for a truck driven by a single driver to complete the shipment, based on the mileage from the shipper's door to the consignee's door. In other words, a shipment must pick up, move to the origin ramp, move by rail, be grounded at the destination ramp and delivered in the same time that would be required for a truck driven by a single driver to do it directly. This does not necessarily imply high-speed rail. The single driver has a log requirement for ten hours driving followed by an eight hour break with an additional six hours of driving in a 24 hour period. The majority of carriers use a transit time guide of 45 miles per hour, particularly in the east where congestion is high. The rail mode has the advantage of being able to use the driver break time to make up for any circuity and delay in the intermodal process.

All carrier types responded favorably to the idea of increased frequency of departure. The time requirements differ however by type of carrier. Truckload carriers want three or four departures through the day and early evening to allow delivery to their customers the following morning. LTL carriers want grounding in the very early hours to allow for sorting and a morning delivery. Package carriers want to complete their 4AM sort process with a rail departure that will allow them to deliver packages the following evening.

In every case, overlying the need for improved transit and more frequent service was the need for reliability. Motor carriers sell a transit performance in the 98% on-time range. In order to divert traffic that currently moves by truck the carriers would require similar reliability standards.

The best example of a model that fits the requirements of speed, frequency, and reliability is the Florida East Coast service between Jacksonville and Miami. This service was consistently quoted as the best. The reliability of the schedule is purported to be excellent and the standards for customer service are high. More than one respondent mentioned that the FEC customer service personnel are highly proactive in alerting their clients of potential delays.

Certain carriers refuse to use any intermodal service in their operation. They feel that this distinguishes their product from the competition. For some, the commodities that they haul do not fit an intermodal strategy. For others it is purely a resistance to the product. Among these players, however, is a concern about capacity shortages in the future. Many carriers believe that an improvement in the economy will put a serious strain on trucking resources. This makes them more open to an intermodal option than they might have been in the past.

For those carriers who do not use intermodal service, either because of their commodity the interest is by preference, there is a strong interest in the development of truck only lanes. More especially in truck lanes that allow for pulling double trailers. The geography of I-81 lends itself to this idea. Carriers can establish drop locations along the route for pick up and delivery of the additional trailers. One carrier suggested that this methodology could produce a 20% improvement in the truck traffic.

After transit time and reliability, price is the most critical factor. All carriers stated that their customers expect a savings when using any intermodal service. Even providing equivalent transit time is offered the expectation is for a lower price. Because this is the perception in the marketplace it must be regarded as the reality. Some carriers suggested that an improvement might be available over time, but the initial movement to intermodal would have to be fueled by a price initiative.

3.2.2.4.9 Application to Project

3.2.2.4.9.1 Required Price Parameters

For an intermodal program to be successful it must prove economical. Specific pricing was not determined from the survey results but it was clear that any intermodal product would need to cost less that is operating a truck with a single driver in the same lane.

3.2.2.4.9.2 Required Service Parameters

As discussed in the conclusions the intermodal service must meet the transit time provided by a truck with a single driver operating door-to-door. The standard would be 45 miles per hour with a schedule based on single driver log requirements, 10 on, 8 off, 6 on in a 24 hour period.

3.2.2.4.9.3 Diversion Potential

While if not possible from the survey to determine exact diversion numbers, it was clear that there is significant freight in both the longer haul southwest market and the shorter haul southeast to northeast market to make the development of a new or improved service worthwhile. Certainly the diversion model will reveal more specific information in this area of study.

3.2.2.4.9.4 Factors Influencing Diversion Potential

Transit time is the number one factor to affect diversion. Both train speed and the frequency of service must allow the product to mimic single truck transit. Reliability follows closely. The 98% on-time delivery standard must be met, for the service will not be effective. Price must be better than truck pricing to entice the customer to consider the change.

3.2.3 ***Rail Carrier Interviews / Discussions***

While the Shipper and Motor Carrier surveys identified rail intermodal diversion opportunities, most indicated a fundamental dissatisfaction with the current level of service offered by railroads in the study corridors. To better understand the apparent disconnect between the desires of the rail intermodal shipping community (shippers and motor carriers collectively), we initiated a series of discussions with representatives from Norfolk Southern and CSX Transportation about their current intermodal strategies, and the environmental circumstances that have limited their ability to attract additional traffic from the highway. These meetings helped identify a number of issues which reduce the effectiveness of intermodal operations, and hamper the railroad's desire to grow traffic in the study lanes.

3.2.3.1 Norfolk Southern

3.2.3.1.1 Current Strategies

Norfolk Southern (NS) currently operates a mix of COFC and TOFC services between the Southeastern United States and the Northeastern United States. Although NS theoretically connects numerous city pairs between the two regions, two corridors represent the preponderance of the traffic. They are: Atlanta to Harrisburg Pennsylvania and the New York Region; and Memphis to Harrisburg, Pennsylvania and the New York Region.

Current service in these two corridors is provided by a single through train between Atlanta and the Northeast (#214) and a connecting block of cars from a Memphis to Atlanta train (#226), which is combined with the locally originated volumes in Atlanta for movement north. These two trains have experienced significant increase in business since the absorption of Conrail, and are expected to continue to post additional growth in the coming year. North-South growth overall has been among the fastest growing segments of NS intermodal, and represent, a substantial portion of the firm's targeted long-term growth.

The railroad's focus on two select corridors represents the evolution of a strategy that seeks to center the scarce resources of the company into the most profitable traffic available. Although a significant amount of excess capacity exists in the network overall, the relative complexities of NS' extensive intermodal operation make it difficult to combine unused train, terminal and route capacity. Thus, significant management effort is required to balance available capacities with available traffic volumes.

Factors currently limiting the growth of traffic in North-South corridors include terminal capacity, train capacity, line capacity, empty equipment availability and interline cooperation. These factors are explained in more detail below:

3.2.3.1.2 Terminal Capacity

For Norfolk Southern, as for most railroads, new intermodal terminal construction is a lengthy and difficult process. Local resident opposition, zoning restrictions, environmental mitigation, and land availability have severely inhibited railroads seeking to expand intermodal terminal operations. NS' recent construction in Austell required some ten years of negotiations and development, while the expansion of the Rutherford, Pennsylvania (Harrisburg) terminal necessitated nearly six years of effort. The current manifestation of these arduous initiatives is that current terminal capacity is considered fixed, and that absent significant productivity and throughput improvements, NS Intermodal Marketing is managing the mix of traffic within individual terminals to maximize overall income.

3.2.3.1.3 Train Capacity

Although NS recognizes there is significant additional capacity in its train network, this capacity is not uniform across days of the week, nor is it consistent with terminal excess capacity. In the case of the North-South traffic, that is the focus of this study, there is currently excess capacity on the trains operating in the corridor. The availability of excess capacity on trains 226 and 214 (and their southbound counterparts) suggests that some additional traffic can be accommodated, but that significant highway diversions will require the current operation be supplemented with more trains in the corridor. A "new train start" generates significant additional fixed costs to the network, and is usually initiated only when there is a sufficient and consistent baseload of traffic to offset a considerable portion of these additional operating costs. Train operating costs perform in a stepped fashion, while revenues are more linear. The addition of a new train increases the expense of operation substantially, until unit volumes and thus revenues become equal. Thus in the North-South corridor, NS is currently seeking to maximize the utilization (and hence the income) from its currently operating trains before adding capacity to the network.

3.2.3.1.4 Line Capacity

Norfolk Southern's rail network in the southeastern US contains many single-track segments. These segments are handling substantial train volumes, and in some cases, cannot easily handle additional traffic. NS is working to add capacity at the most severe of these "choke points", but some that do exist in the North-South corridor may not secure internal funding for some time. NS is prioritizing and scheduling trains to address these capacity constraints, but the consequence of the volume is that on some lines, and during some periods, train operation slots may be unavailable. And whereas the addition of one or two trains can be accommodated on most lines, the six or eight departures that might be required to effect significant highway diversions are currently unavailable.

3.2.3.1.5 Empty Equipment Availability

In the Eastern United States, most markets are consumption oriented, and thus have less freight moving outbound than moving inbound. To overcome this dearth of return loads, motor carriers will reposition empty equipment to the next closest traffic surplus region in an effort to reduce empty miles. This practice – called "triangulation" – means that trucks moving loaded to the Northeast from the South will often move empty to the Midwest and then return loaded to the Southeast. The flexibility to dispatch empty trucks in any direction to maximize the number of revenue generating miles is not easily replicated in rail intermodal. Rather, because terminal and drayage expenses represent a significant portion of the total door-to-door cost equation, railroads tend to cycle equipment back to its original point of origin to balance locomotives, railcars, trailers and containers – even if a substantial portion of that equipment is moved empty. This effectively raises the costs of intermodal relative to motor carrier transport, and thus in lanes where there is a significant imbalance between inbound and outbound freight, railroads are often less competitive than trucks.

According to its experience in the market, NS has found that several of the principal origination points for traffic along the study corridors are severely imbalanced. These include Huntsville, AL; New Orleans, LA; and Memphis, TN. For these points, freight is primarily outbound, requiring that NS reposition empty trailers, containers and railcars to these markets. Where low-cost and consistent supplies have been available – such as Memphis, TN intermodal services have been competitive vis-à-vis highway transport. Thus where the supply of empty equipment has been more sporadic or expensive, NS has provided a more sporadic and expensive service to the market. While NS recognizes the opportunity to divert highway traffic to rail intermodal in these regions, the unavailability of empty equipment has made these services less attractive to the railroad, and the equipment formerly assigned to these markets has been reassigned to more profitable corridors.

3.2.3.1.6 Interline Cooperation

Two regions that appear to be contributing significantly to the North-South traffic on I-81, are Central and Eastern Texas. Norfolk Southern and the Kansas City Southern Railway (KCS) have teamed up to provide through intermodal service from Dallas, TX. The KCS portion of the service is via an interline service arrangement with Norfolk Southern over the Meridian, MS gateway. Both NS and KCS have identified significant traffic potential in this corridor, and the carriers are working to capture this freight – currently moving on the Interstate – to an improved rail intermodal product. In addition to the work with KCS, Norfolk Southern's Intermodal Group has sought to negotiate interline operating agreements with BNSF and UP. It was hoped that these railroads would forward Texas traffic to NS at New Orleans and Memphis for subsequent movement to the Northeast via Norfolk Southern. To date however, these initiatives have met with only limited success. The Western railroads (BNSF and UP), have historically preferred to concentrate their efforts – and hence their assets – in markets local to their own system. With the rapid growth in rail intermodal demand, intermodal equipment is in limited supply. Most rail carriers have discouraged the development of less profitable interline services (except transcontinental services) in favor of local markets where scarce assets can be managed more tightly.

3.2.3.1.7 Conclusions

It is apparent that NS is pursuing a logical strategy for intermodal market development. The firm is focusing its energies and its limited resources on those corridors that provide the greatest operating income. The factors that have influenced the company's commercial choices include terminal capacity, train capacity, line capacity, empty equipment availability, interline service performance, and interline cooperation. To some degree, each of these factors exists in the North-South Corridors that are the focus of this study. While none of these factors is insurmountable, each represents an added expense that when weighed against available alternatives prevents some intermodal lanes from developing, while others thrive.

But as Norfolk Southern's current intermodal network equilibrium is economically driven, so the future solution will be established. Changing the current cost equation for under-served markets will fundamentally change the embedded priorities, and can achieve Virginia's desired but currently unattainable results.

3.2.3.2 CSX Transportation

3.2.3.2.1 Current Operations

CSX Intermodal currently operates seven trains along the study corridors. Trains Q-172/173 operate between Jacksonville, Florida and South Kearny, New Jersey and are primarily composed of UPS and premium service truckload traffic. Train Q-176 also operates from Jacksonville, Florida to South Kearny, New Jersey and handles a large volume movement of empty trash containers from Collier, Virginia to the New York region, in addition to conventional intermodal equipment. Trains Q-174/175 operate between Jacksonville, Florida to CSX's ramp west of Boston. CSX also operates a pair of trains – Q-195/196 that operate between Atlanta, Georgia and South Kearny, New Jersey. These Atlanta trains moves along the I-95 (former Seaboard Coast Line and Richmond, Fredericksburg and Potomac Railroads) corridor from Yemassee, South Carolina to the North, turning westward through Augusta, Georgia and on to Atlanta.

3.2.3.2.2 Current Strategies

CSX has targeted the I-95 corridor for intermodal growth, but currently lacks double-stack clearances along the length of the route.

Obstructions on the line exist in the form of two tunnels: one in Washington, DC at Virginia Avenue, and one in Baltimore, Maryland at Howard Street. Both tunnels are located in densely populated urban areas and thus are difficult to improve or circumvent. There are several other clearance obstructions exist around Philadelphia, Pennsylvania such as overhead catenary wires, highway bridges, and railroad overpasses. The total cost of relieving these obstructions thus far has been prohibitive. Currently, all trains operating on CSX lines along the I-95 corridor are TOFC or single-stack domestic and international containers. Double stacking of trash containers (2/3 height containers) does occur on the CSX lines, giving the appearance of double-stack operations along the I-95 corridor.

Much of CSX Intermodal strategy has focused on high-revenue and high-volume East-West traffic flows. With the capture of several transcontinental movements through Pacer Stacktrain (formerly APL Stacktrain), much of CSX's terminal and equipment capacity is consumed in servicing these lanes. As a result, a second pair of intermodal trains operating from Atlanta to the Northeast was withdrawn to provide terminal capacity for the preferred East-West Traffic.

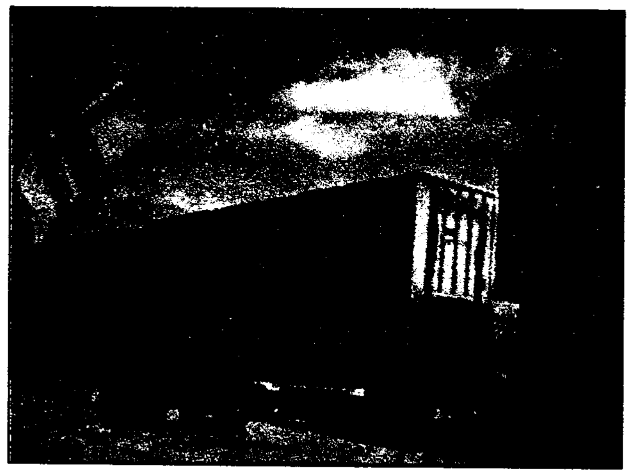
South of Jacksonville, Florida, CSX operates a number of intermodal feeder trains, connecting Orlando, Tampa and Miami to the Northeast. These trains connect to the through trains outlined above to provide truck – competitive rail intermodal service between Eastern Florida and the Northeast states.

3.2.3.2.3 Conclusions

While CSX desires to grow traffic along the I-95 corridor, limited capacity in existing terminals along the route reduces the likelihood that such expansion will be significant. Although CSX continues to seek funding for clearance improvements along the corridor, it will for the foreseeable future be unable to obtain the economies of double-stack service. In the competition for scarce railroad resources, the lower margin, single-stack services along the coast have difficulty competing against long haul, high-margin, double-stack transcontinental traffic.

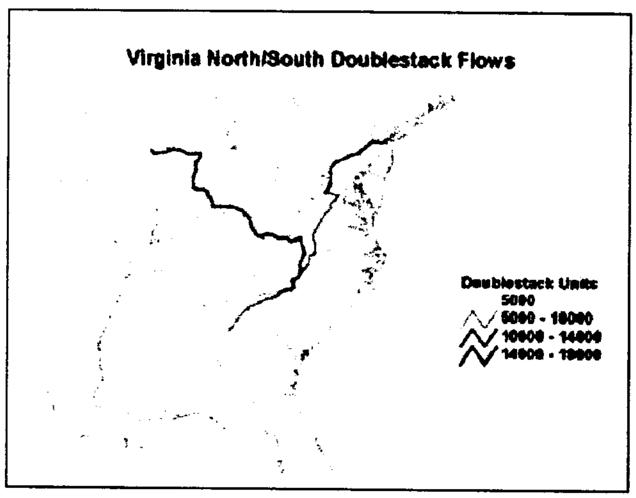
3.3 Review of Current Rail Intermodal Service Options

Current NS and CSX intermodal product offerings can be segmented by type of service. The two types of service that exist in the north-south corridor through Virginia are double stack container service and TOFC, with single stack COFC service, although all three services may be intermixed on the same train. Other intermodal products that are available and could be used in the corridor include RoadRailer, Expressway, and the European Ferry Model.



3.3.1 __Double Stack Container Service__

Double stack container technology was introduced in 1977 by the Southern Pacific and Sea-Land in order to achieve the economic benefits of operating more containers per train in mini-land bridge service between Los Angeles and Houston. Although domestic containerization has been introduced in subsequent years, the majority of NS and CSX double stack container traffic in the north-south Corridor through Virginia continues to be maritime traffic. Traffic flows move largely to or from the maritime-oriented facilities located in New Jersey at Expressway, E-Rail, and APL. As shown by Figure 20, double stack container traffic comprises 19% of total intermodal traffic in the north/south corridor.



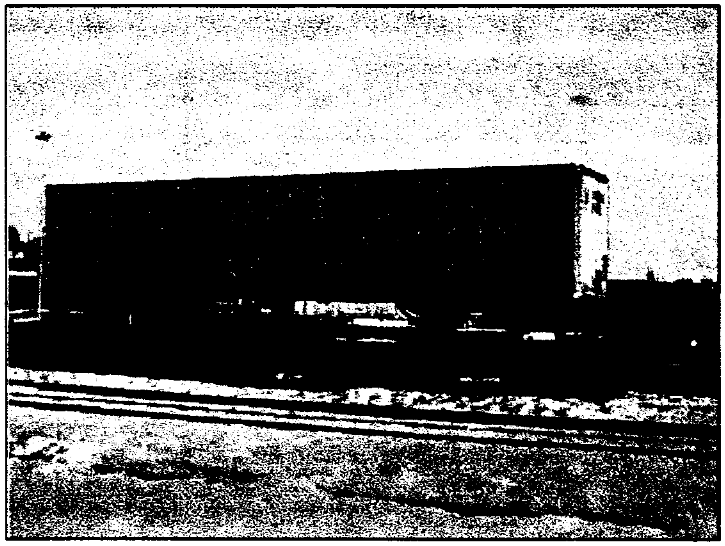
Although there are significant economic benefits from operating trains loaded with double stack container service instead of single stack containers, the principal disadvantages of double stack container technology are the additional terminal time required to stack and tie down the containers and the larger volumes necessary in order to make up double stack trains. Thus, the service is most appropriately offered where large origin/destination and long haul traffic flows exist.

Equipment Distribution of Virginia North-South Rail Traffic 2001

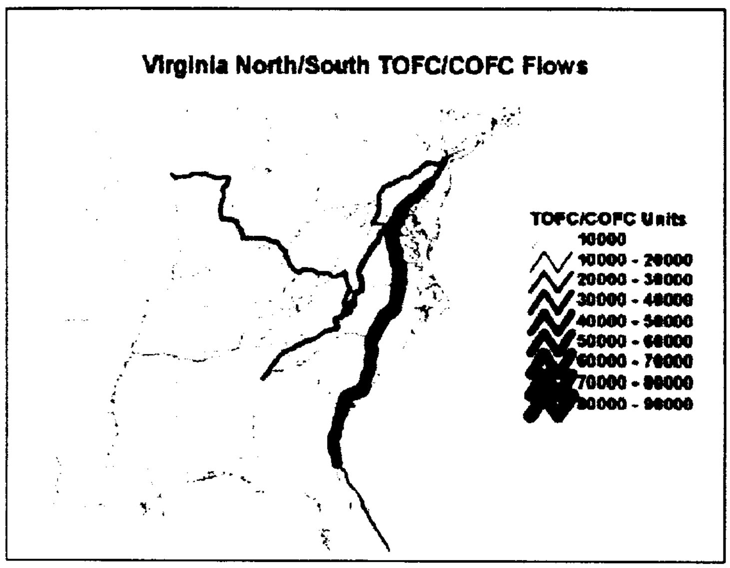
	Origin		Destination	TOFC/ COFC Units	Double-stack Units	Total	TOFC COFC Share	Double-stack Share
10	New York, NY	29	Jacksonville, FL	13,680	880	14,560	94%	6%
13	Washington, DC	40	Atlanta, GA	13,400	360	13,760	97%	3%
64	Chicago, IL	18	Greensboro, NC	13,040	680	13,720	95%	5%
40	Atlanta, GA	10	New York, NY	8,720	3,400	12,120	72%	28%
18	Greensboro, NC	64	Chicago, IL	10,600	680	11,280	94%	6%
10	New York, NY	40	Atlanta, GA	8,720	1,160	9,880	88%	12%
57	Detroit, MI	20	Norfolk, VA	2,280	5,640	7,920	29%	71%
29	Jacksonville, FL	10	New York, NY	6,600	400	7,000	94%	6%
23	Charlotte, NC	64	Chicago, IL	2,000	4,840	6,840	29%	71%
20	Norfolk, VA	57	Detroit, MI	1,600	4,760	6,360	25%	75%
13	Washington, DC	29	Jacksonville, FL	6,160	120	6,280	98%	2%
10	New York, NY	31	Miami, FL	4,840	440	5,280	92%	8%
73	Memphis, TN	10	New York, NY	2,680	2,080	4,760	56%	44%
31	Miami, FL	10	New York, NY	4,600	120	4,720	97%	3%
29	Jacksonville, FL	13	Washington, DC	4,480	40	4,520	99%	1%
64	Chicago, IL	23	Charlotte, NC	1,720	2,760	4,480	38%	62%
29	Jacksonville, FL	12	Philadelphia, PA	3,360	40	3,400	99%	1%
12	Philadelphia, PA	29	Jacksonville, FL	2,880	120	3,000	96%	4%
13	Washington, DC	31	Miami, FL	2,840	160	3,000	95%	5%
12	Philadelphia, PA	30	Orlando, FL	2,720	40	2,760	99%	1%
12	Philadelphia, PA	31	Miami, FL	2,560	120	2,680	96%	4%
73	Memphis, TN	11	Harrisburg, PA	1,840	720	2,560	72%	28%
28	Savannah, GA	12	Philadelphia, PA	2,320	120	2,440	95%	5%
26	Charleston, SC	64	Chicago, IL	400	1,840	2,240	18%	82%
29	Jacksonville, FL	3	Boston, MA	1,920	120	2,040	94%	6%
31	Miami, FL	12	Philadelphia, PA	1,720	160	1,880	91%	9%
18	Greensboro, NC	10	New York, NY	1,760	80	1,840	96%	4%
13	Washington, DC	34	Tampa, FL	1,680	-	1,680	100%	0%
10	New York, NY	28	Savannah, GA	1,520	80	1,600	95%	5%
3	Boston, MA	29	Jacksonville, FL	1,480	40	1,520	97%	3%
26	Charleston, SC	12	Philadelphia, PA	1,480	-	1,480	100%	0%
28	Savannah, GA	10	New York, NY	1,320	120	1,440	92%	8%
30	Orlando, FL	12	Philadelphia, PA	1,400	40	1,440	97%	3%
40	Atlanta, GA	13	Washington, DC	1,360	80	1,440	94%	6%
83	New Orleans, LA	12	Philadelphia, PA	1,360	40	1,400	97%	3%
80	Mobile, AL	12	Philadelphia, PA	1,360	-	1,360	100%	0%
28	Savannah, GA	3	Boston, MA	1,200	80	1,280	94%	6%
10	New York, NY	77	Jackson, MS	240	1,040	1,280	19%	81%
31	Miami, FL	13	Washington, DC	1,160	120	1,280	91%	9%
26	Charleston, SC	13	Washington, DC	960	280	1,240	77%	23%
13	Washington, DC	18	Greensboro, NC	1,000	80	1,080	93%	7%
49	Cincinnati, OH	26	Charleston, SC	400	680	1,080	37%	63%
10	New York, NY	30	Orlando, FL	1,040	40	1,080	96%	4%
13	Washington, DC	30	Orlando, FL	960	40	1,000	96%	4%
64	Chicago, IL	45	Johnson, City, TN	680	320	1,000	68%	32%
10	New York, NY	73	Memphis, TN	400	600	1,000	40%	60%
Total				**170,760**	**40,440**	**211,200**	**81%**	**19%**

Figure 20

3.3.2 TOFC/COFC Service



The more generalized intermodal service available in the marketplace through NS and CSX is single unit TOFC/COFC service. As shown by **Figure WCG-__** this traffic comprises 81% of the total of volume moving in the north-south corridor through Virginia. Primary users include manufacturing, retailing and distribution companies, large trucking companies, postal and express shippers, third party forwarders and smaller maritime users.

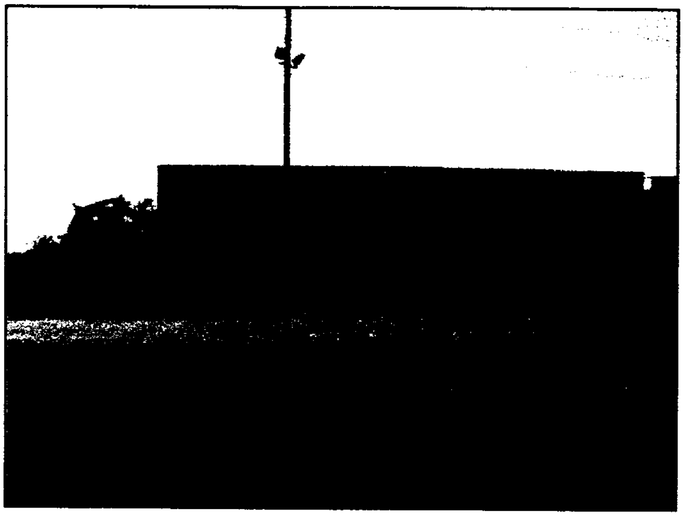


3.3.3 Other Technologies

3.3.3.1 RoadRailer

The RoadRailer technology was introduced to the US railroads by Robert Reebie, a consultant and founder of Reebie Associates. RoadRailer technology is a "car-less" technology that utilizes a separate rail bogie (truck) to convert a highway trailer to rail service. A primary advantage of RoadRailer is the short terminal time required to convert either from the rail to highway mode or from the highway to rail mode. Conversely a major drawback of this car-less technology is its high initial capital cost and its need to operate in trains dedicated exclusively to handling RoadRailers.

Through its Triple Crown subsidiary, Norfolk Southern operates approximately 85 trains per week among a network of terminals located in Atlanta; Chicago; Dallas/Fort Worth; Detroit; Fort Wayne; Harrisburg, PA.; Jacksonville, FL.; Kansas City; Newark, N.J.; St.



Louis; Sandusky, OH; and Toronto[9]. Principal users of the Triple Crown network include auto companies, auto parts suppliers, and other firms that have concentrated, repetitive, and high volume product flows in the same corridor. The Triple Crown equipment is unlike conventional Trailer-On-Flat-Car (TOFC) or Container-On-Flat-Car (COFC) operations in that the trailers are themselves the body of the railcar. The RoadRailer trailer operates over the highway as a conventional trailer and then attaches to a rail "bogie"[10]. Trailers are converted from road to rail operation using an air-ride suspension system. This system minimizes the infrastructure demands at the terminal site: no crane or lift equipment is necessary. The RoadRailer system provides a truck competitive, damage-free transportation product, using only about half the locomotive power and fuel of conventional piggyback trains[11]. At present, there are no RoadRailers operated in the north/south traffic lanes through Virginia.

Because of the high cost of the lift equipment essential to conventional rail intermodal operation, railroads traditionally eschew markets that do not generate 40,000 "lifts"[12] per year. The cost of new terminal construction is approximately $250,000 per acre (not including land acquisition costs), with most recent terminals consuming in excess of 200 acres. Thus conventional intermodal terminal economics requires a $7,500,000 investment and approximately 130 trailers of freight *in each direction per day* to break-even. Conversely, RoadRailer operations have a much-lower break-even point. Terminal construction costs average between $70,000 and $150,000 per acre, and can be erected on as little as 50 to 60 acres[13].

3.3.3.2 Expressway

Expressway is an intermodal system, including a unique technology, that was developed to provide short-to-medium-haul rail transportation service that would be attractive to motor carriers. Expressway is owned and operated exclusively by the Canadian Pacific

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[9] http://www.triplecrownsvc.com

[10] The RoadRailer bogie is a rail "truck" assembly consisting of two wheelsets linked by a bolster assembly. It is similar in design to a single conventional railcar truck assembly.

[11] http://www.triplecrownsvc.com

[12] A "lift" is the term used to describe the "taking-off" or "putting-on" a trailer or container to/from a railcar in conventional intermodal operations. The annual tally of lifts generally counts a lift-off and a lift-on as a single "lift".

[13] While both conventional and RoadRailer terminals have similar lighting, fencing, and administration facility needs, the paving at conventional intermodal facilities must be substantially thicker to accommodate the heavy weight of trailer and container lift equipment.

Railway (CPR). Expressway currently serves five stations with hubs at Toronto, Montreal, and Detroit, in a linear corridor of about 560 miles. However, Expressway intends to extend its service to Chicago in 2003, thereby increasing its total corridor length to about 770 miles.

According to CPR, Expressway is a truck-like intermodal transportation system designed to handle **standard, non-reinforced highway trailers** in the short-to-medium-haul market, with the following key characteristics:

- Expressway rail cars combine high-ride quality with flexible loading (using a drive-on and drive-off ramp system);
- Expressway offers easy to use automated reservations and terminal check-in; and,
- Expressway operates dedicated trains between dedicated terminals.

Also, according to CPR, Expressway was designed as a means for that railway to participate in short-to medium-haul markets by providing a lower operating cost system for motor carriers.

CPR believes that there is a market niche for an efficient line haul rail service designed specifically for such short-haul markets in heavy truck lanes, to be operated in partnership with motor carriers. CPR sets forth the following requirements to successfully serve that market niche:

- Consistent, market-driven train schedules;
- Close access to key roadway links for terminals;
- Safely handles non-reinforced trailers without damaging to contents; and
- Reduction in the overall costs of transportation of the motor carriers and their customers.

Expressway states that it provides a consistent, market-driven scheduled line haul service with competitive transit times, 99% reliability, and high productivity:

- Each corridor has four train starts a day, two in each direction, with up to 90 platforms per train;

- Dedicated train and power; and
- Truck comparable transit times.

Although CPR would like increased train frequency of up to 4-6 train starts per direction, per day, line capacity limitations have precluded such an expansion of Expressway service.

Dedicated Expressway terminals are located close to markets and the highway system, and have efficient and simplified operating procedures:

- Purpose built terminals;
- Handling operations average under 5 minutes per trailer;
- Trucks achieve throughput times of 15 minutes or less; and
- Terminals are open for pick-up delivery 24/7.

Expressway's unique railcar technology is said to provide superior ride quality with an integral loading system:

- Cars have excellent ride quality and minimal "slack" action; and
- Each platform can handle any type of trailer.

Appendix 4 contains selected photographs of CP's Expressway equipment taken at its Toronto West terminal on January 23, 2003.Expressway's information system uses a centralized control system that was designed specifically for Expressway:

- The entire business process is driven from the initial data entry from the automated reservation system; and
- The system provides an integral customs application for cross-border shipments.

Expressway is oriented to be a partner to the trucking industry, not a competitor. Its pricing reflects a lower operating cost system that encourages profitable growth for all stakeholders. Expressway sees the following advantages for its motor carrier partners:

- Lower cost operations:
  - Improved margins and/or competitiveness; and
  - Extended savings with added capacity and network growth.
- Maintain or improve service:
  - Service reliability, reserved slots; and
  - Line haul not impacted by border or highway congestion.

- Capacity to Grow
- Grow business with less capital, particularly for over-the-road tractors; and
- Address driver shortage, home terminal operations.
- Safety:
    - Fewer road miles equal fewer accidents.

CPR was successful in attracting 60,000 trailers in 2001, with continuing growth in 2002, and projected for 2003. Customers are pure motor carriers, fleet owners, and truckers who support the automotive industry's just-in-time parts needs. CPR puts its current market share of the total market at 2-2.5%, with a maximum potential of 12-15% without capacity expansions. However, with significant capacity increases, CPR projects a possible market share as large as 33% of the total market.

From our perspective, an Expressway-like system provides a rail intermodal product that should be attractive in multiple, heavy truck lanes, including conversion of the significant amount of traffic in the 600-900 mile range from the deep south and the mid-south to the northeast region that has been identified by this Market Study.

3.3.3.3 *Rolling Highway*

A relative to the Expressway concept is the Rolling Highway used across Switzerland and Austria, as well as in the English Channel Tunnel. Using equipment similar to Expressway, complete tractor and trailer sets are carried on the train. In the longer Alp

crossings, a separate sleeping car is provided for the drivers.

The advantages of these services include:

- Equipment and driver stay together, no need to arrange for dray services or schedule pick-up or drop-off at the ramps.

DRAFT

- Fast loading and unloading, no shuffling back and forth with a yard tractor to bring each trailer on board, each driver just follows the previous truck.

- Security, the driver stays with or near the load.
- Driver is making progress toward destination, while resting at the same time.
- Can be mixed with other services, such as Expressway or passenger services.
- Can carry any type of highway equipment, including straight trucks.
- Safety.

However, the service has significant disadvantages as well:

- Schedule, if frequencies and speeds are insufficient, the cost of waiting for the driver and tractor can be significant;
- Low load to tare ratio, for each load there is a significant dead weight in tractor, flat car, rider sleeper, and locomotive;
- Clearance, not a problem in the United States, but solutions to fit a trailer on top of a flat car within smaller European clearances have led to the use of eight axle flat cars with very small wheels, consequently, with high maintenance costs.

3.3.3.3.1 Application

The most successful applications of Rolling Highway have been across the Alps. Several factors contribute to the competitiveness of the service:

- The Swiss mileage and weight charges;[14]
- Difficult terrain;
- High volume corridor.

As shown in the attached price list, Hupac has four crossings each day in each direction. The pricing does give a crude approximation of costs. For example, Singen (near Stuttgart) to Milan is 334 miles, with a fare of EUR 445 (USD 476)[15].

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[14] Heavy Vehicle Fee, http://www.tradeport.org/ts/countries/switzerland/mrr/mark0017.html.

Timetables and prices[1]

Valid from 28.10.2002

Departure day	Closing time	Departure time	Arrival time	Profile	Price*	Ma
Lugano Vedeggio - Freiburg im Breisgau						
12345	17.00	17.10	23.50	3.80m	405.-	
Freiburg im Breisgau - Lugano Vedeggio						
12345	22.45	23.00	06.30	3.80m	405.-	
Milano Greco Pirelli - Singen neu						
12345	10.30	10.45	20.10	3.80m	320.-	
12345	21.00	21.15	06.00	3.80m	445.-	
Singen neu - Milano Greco Pirelli						
12345	08.30	08.45	17.45	3.80m	320.-	
1234	20.45	21.00	05.45	3.80m	445.-	
7	19.00	19.15	05.45	3.80m	445.-	
Lugano Vedeggio - Basel Kleinhünigen						
12345	22.15	22.30	04.30	3.80m	355.-	
Basel Kleinhünigen - Lugano Vedeggio						
12345	20.45	21.00	04.30	3.80m	355.-	
Empty vehicles						
Attention: on all routes with sufficient capacity					**120.-**	

* Prices in EUR without VAT
** Firm space confirmation only up to 42 tonnes

Figure 21

Ökombi, the Austrian intermodal company, maintains a network of Rolling Highway services into and out of the country shown in Figure 22.[16]

[15] March 27, 2003 Exchange rate , Yahoo! Finance, http://finance.yahoo.com/q?s=EURUSD=X&d=c.

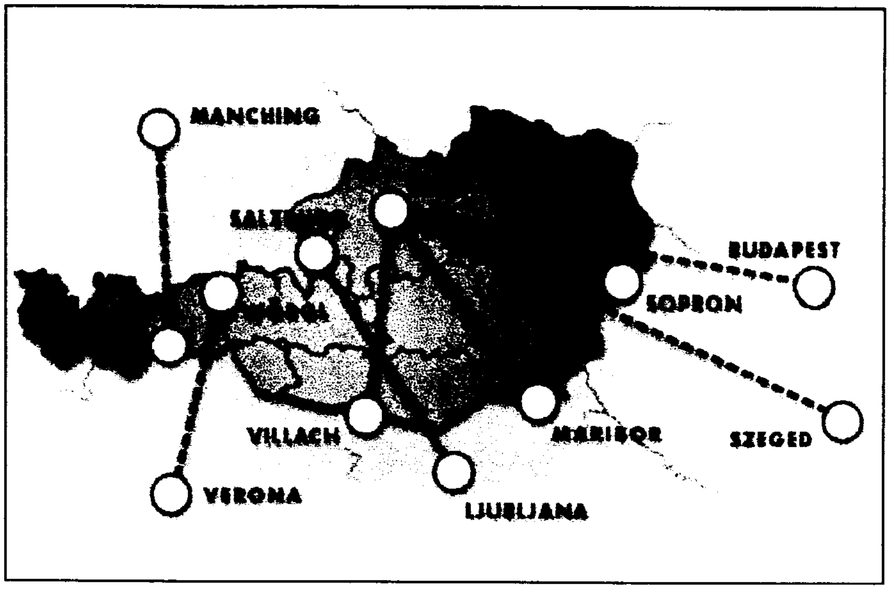

Figure 22

3.3.3.3.2 Market Acceptance

While it is an established service across the Alps, overnight Rolling Highway (as opposed to short haul tunnel crossings) has not had great success elsewhere. An experimental service in Sweden (Strömstad-Trelleborg), while showing theoretical promise[17], was abandoned after six months for insufficient volume.

In Europe, there are a numerous overnight ferry services, many with alternative land or land-short ferry alternatives. While many handle unaccompanied trailers, the larger flow is complete trucks with drivers. A ferry is able to offer significantly more amenities than a single sleeping car (full restaurants, slot machines, shopping), and thus is closer to a rolling truck stop in nature.

The closest U. S. model is Amtrak's Auto Train for passenger autos and their drivers and passengers, operating between Lorton, VA, and Sanford, FL. However, since no similar services for trucks exist in the U. S., it is difficult to judge the potential level of acceptance, especially among the smaller companies and independent operators to whom the service is likely to appeal.

However, to attract the segment of the truck market that consists of independent and small operators, a service that keeps truck, trailer, and driver together is almost a requirement. A service that is similar in cost to driving, reasonably frequent, offers travel times that are consistent with rest requirements, would be almost certain to attract some of this traffic. The competitive environment would then begin to demand the expedited travel times that 'moving rest' would offer.

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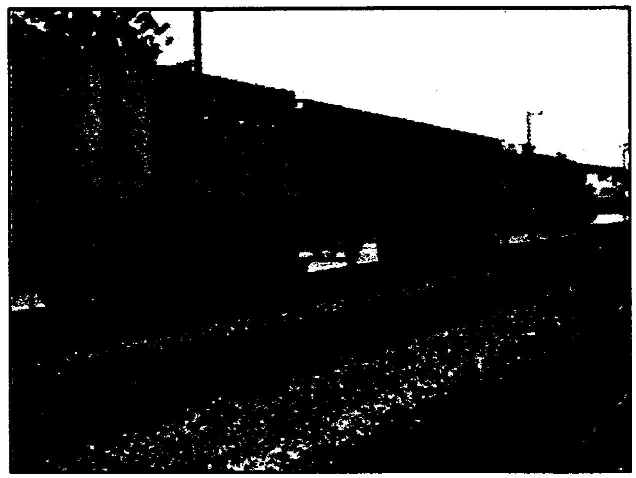
[16] Rollende Landstraße, http://www.oekombi.at/2_rola/2_txt_a0.html.
[17] Björn Bryne and Daniel Ljunghill, Rullande Landsväg för transittrafik Norge-Kontinenten, Royal Institute of Technology, Stockholm, Sweden 1995.

Optimal services would allow a driver to put in a full shift of driving, and then get the required rest. This could be accomplished not only by providing terminals one day from major traffic centers, but also terminals that allow a driver to leave the terminal, deliver or unload, pick up or load, and return to the terminal during one work period.

3.3.3.4 Other Models

A small amount of freight moves through Virginia as express shipments on Amtrak, either carried in RoadRailer equipment, or in box cars. Prior to Southern Railway turning over its passenger service to Amtrak, some of Southern Railway's passenger trains on the Piedmont route were combined with intermodal service, leaving Washington with a few passenger cars, and adding intermodal cars on the rear of the train in Alexandria. At current levels of passenger service through Virginia, any such combination of service is unlikely to have a noticeable impact on truck traffic.



3.3.3.5 Conclusions

While some portion of the available volume will likely never be diverted to rail intermodal service, the availability of a menu of service and technology alternatives provides the greatest opportunity for highway to rail diversion across the segmented motor carrier market. Currently, only 53% of the highway traffic in the I-81 fits the traffic that is divertable to current (conventional) rail intermodal service. With the addition of Expressway and Rolling Highway technologies to an improved conventional rail intermodal product, rail intermodal services can theoretically compete for all non-hazardous freight.[18] Thus the potential for significant diversions is increased, as only modest market penetration in these massive (small and medium) truck segments provides substantial modal shift.

3.3.4 Current Rail Operations in the Corridor

Current rail operations in the corridor are provided by two Class I railroads, Norfolk Southern Railway Company ("NS") and CSX Transportation, Inc. ("CSX"). Since the 1999 split-up of Conrail between these two carriers, both NS and CSX provide single system service between major origins and destinations in the Northeast and Southeast regions.

[18] Reebie TRANSEARCH, traffic through Virginia using 20 miles or more of I-81, dry van trucks over 500 miles haul as a share of all loaded trucks.

Figure 23 shows major highway tonnage flows through Virginia. As shown by Figure 23, the largest highway tonnage flows through Virginia are between the Memphis Gateway, New Orleans Gateway, Jacksonville, FL and the Northeast region. The Memphis-Northeast region highway tonnage flow is via I-40 from Memphis to a point near Knoxville, and then via I-81 through Virginia. Similarly, the New Orleans-Northeast region highway tonnage flow is via I-59 and I-75 to a point near Knoxville, and then via I-81 to the Northeast region. Within the Northeast region, traffic disperses to or aggregates from Harrisburg, Philadelphia, New Jersey, and beyond. In general, the NS System parallels the highway network in all of these markets.

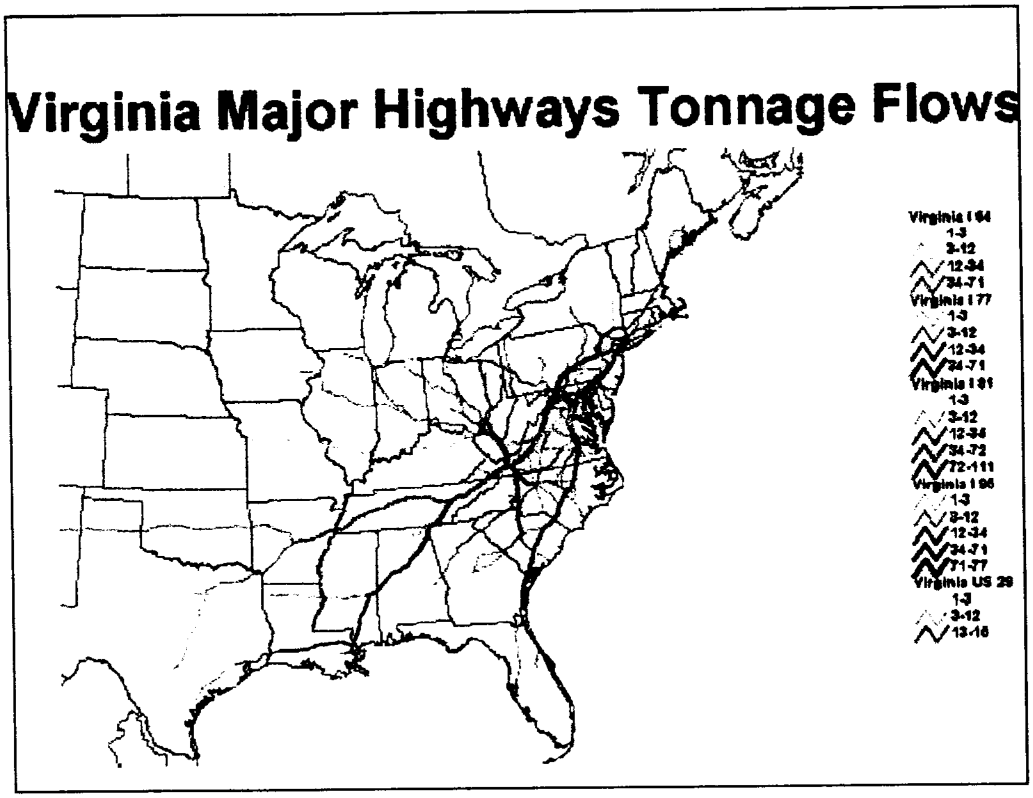


Figure 23

Figure 23 also shows a significant flow of highway tonnage on I-77 through Virginia, a large portion of which combines with the I-81 Corridor flow to and/from the Northeast region. Primary concentration points on I-77 in the Southeast Region are Columbia, Charlotte, and Greensboro. The NS System also parallels I-77.

Figure 23also shows a significant flow of highway tonnage on I-95 between Jacksonville and the Northeast region. At Richmond, the I-95 flow is supplemented by traffic to and from I-64 that primarily originates or terminates in the Hampton Roads/Newport News/ Norfolk area. In combination, these highway tonnage flows extend to Baltimore, Philadelphia, New Jersey, and other points in the Northeast region. The CSX System generally parallels the highway network in all of these markets.

3.3.4.1 Norfolk Southern

Figure 24 shows the locations of the relevant interstate highway and NS railroad networks, between Atlanta in the south and Harrisburg and Philadelphia on the north. As shown by Figure 24, NS's rail lines generally parallel the major highway tonnage flows in the I-81 corridor and I-77 corridors. Note that NS can also serve the I-95 corridor by route extensions south of Columbia to points near Savannah and/or Charleston, albeit with greater route circuity than that of the CSX system.

Two of NS's primary rail routes have been considered in this Study, both of which are shown with the relevant interstate highways in Figure 24. The first, NS's Shenandoah Route, is defined generally as being located between Harrisburg (and points north) through Hagerstown, Roanoke, and Knoxville to Atlanta. NS's second primary route, its Piedmont Route, extends generally from Harrisburg (and points north) to Hagerstown, Manassas, Greensboro, Charlotte, Spartanburg, and Greenville to Atlanta.

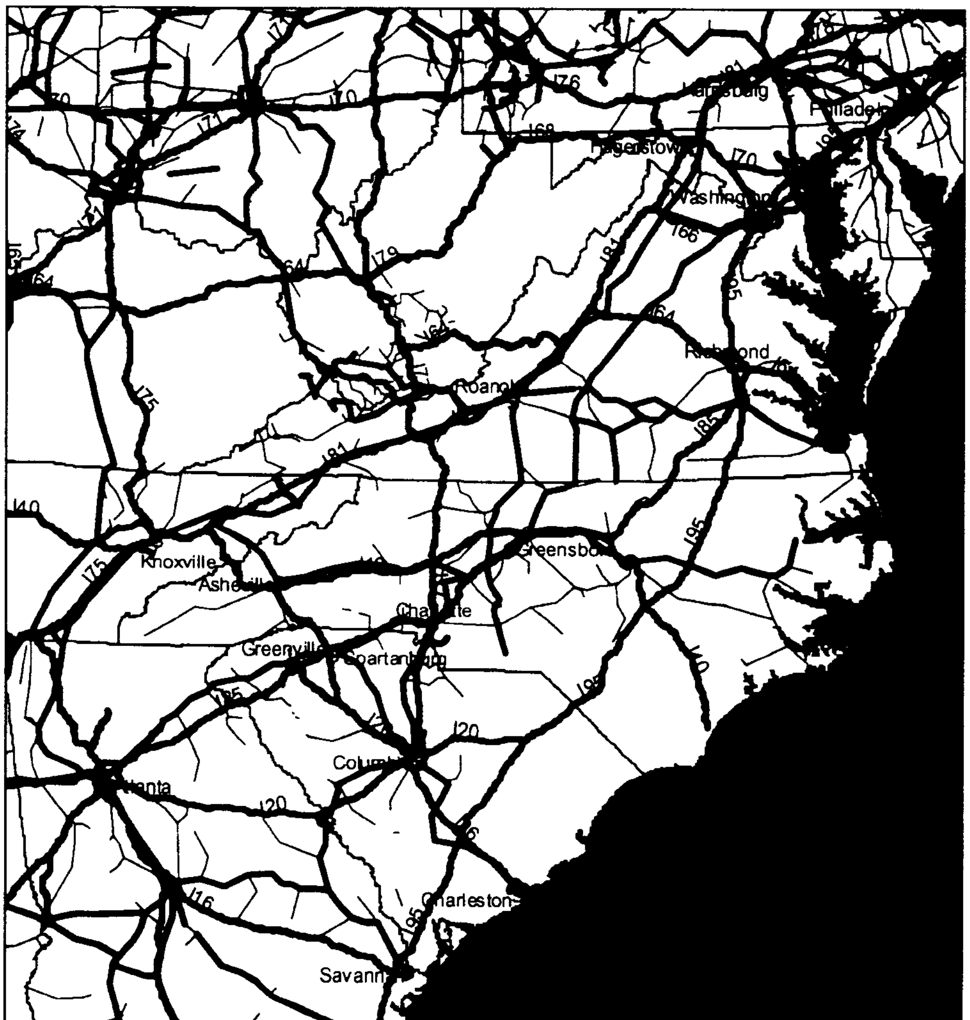


Figure 24

Potentially, NS could extend its Piedmont Route into the Northeast region from Alexandria, Virginia via the Northeast Corridor ("NEC") whose rail lines it has the right to use. At present, however, NS does not operate any through trains in the NEC because of operating, maintenance, and capacity constraints imposed by Amtrak.

3.3.5 ***Description of the Physical Routes***

3.3.5.1 *Shenandoah Route*

NS's Shenandoah Route between the Northeast region, Harrisburg, and Hagerstown uses former Conrail lines. South of Hagerstown to Bristol, the route uses NS's former N&W line. Beyond Bristol, the Shenandoah Route uses former Southern Railway lines to Knoxville and Atlanta. Much of the Shenandoah Route has significant curvature and grades as it traverses the foothills of both the Appalachian and the Blue Ridge Mountains.

Figure 25 shows a map of NS's Shenandoah Route between Harrisburg and Atlanta. NS's Shenandoah Route could connect existing, large intermodal hubs in Harrisburg and Atlanta. The Route is sufficiently long that, if significantly upgraded, it would be suitable for conventional TOFC/TOFC service. Moreover, all or portions of the Route could be used for an Expressway-like service, if terminal space were available.

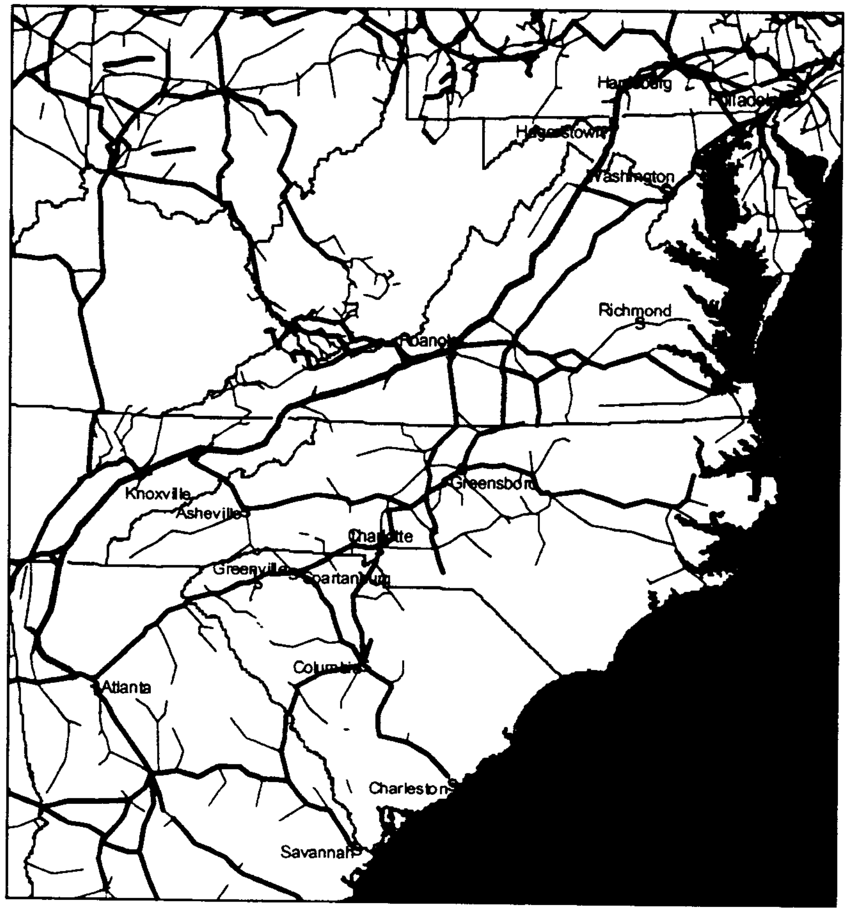


Figure 25

Figure 26 shows selected operating characteristic of NS's Shenandoah Route as derived from its Operating Timetables:

- The Route is 832 miles long;
- Train Control applies to 570 miles, or about 69% of the total Route; however the remaining 31% of the Route does not have signals;
- Except for 37.8 miles of double track, the Route has only one main track;

Maximum current zone speeds for passenger and intermodal train service are 60 mph, but much 50 mph maximum speed territory exists. In addition, there are numerous speed restrictions south of Hagerstown that often restrict speeds to 25 mph or lower.

In our opinion, because of its mountainous location, even if it were upgraded, NS's Shenandoah Route could not produce average intermodal train speeds in excess of 45 mph, and its maximum authorized speeds could probably not exceed their current 60 mph maximum authorized speeds at most locations.

Selected Operating Characteristics of NS Shenandoah Route
Harrisburg, PA - Atlanta, GA via Knoxville

	Miles	Tracks	Method of Operations	Max. Authorized Zone Speeds PX/IM
Harrisburg-Hagerstown				
CP Capital-CP Ship	40.4	1	TC	50
CP Ship-Hager	34.4	1	TWC	50
Subtotal	74.8			
Hagerstown-Bristol				
Hagerstown-Roanoke	259.8	1	TC	50
Roanoke-Walton	37.8	2	TC	50
Walton-Bristol	110.7	1	TC	60/60
Subtotal	408.3			
Bristol-Austell				
Bristol-Cleveland	212.7	1	TWC	60
Cleveland-Cohutta	14.5	1	TWC	35
Cohutta-Inman Yard	121.5	1	TC	60/60
Subtotal	348.7			
Total	**831.8**			

Notes:

(1) Data from NS Timetables
(2) TC means Train Control
(3) TWC means Train Warrant Control

Figure 26

3.3.5.2 *Piedmont Route*

NS's Piedmont Route between the Northeast region, Harrisburg, and Hagerstown also uses former Conrail lines. South of Hagerstown to Front Royal, the route uses NS's former N&W line. From Front Royal to Manassas, the Piedmont Route utilizes a former Southern Railway branch line. South of Manassas, the Piedmont Route runs via the former Southern Railway main line to Greensboro, Charlotte, Greenville, and Atlanta. Figure 27 shows a map of NS's Piedmont Route between Harrisburg and Atlanta.

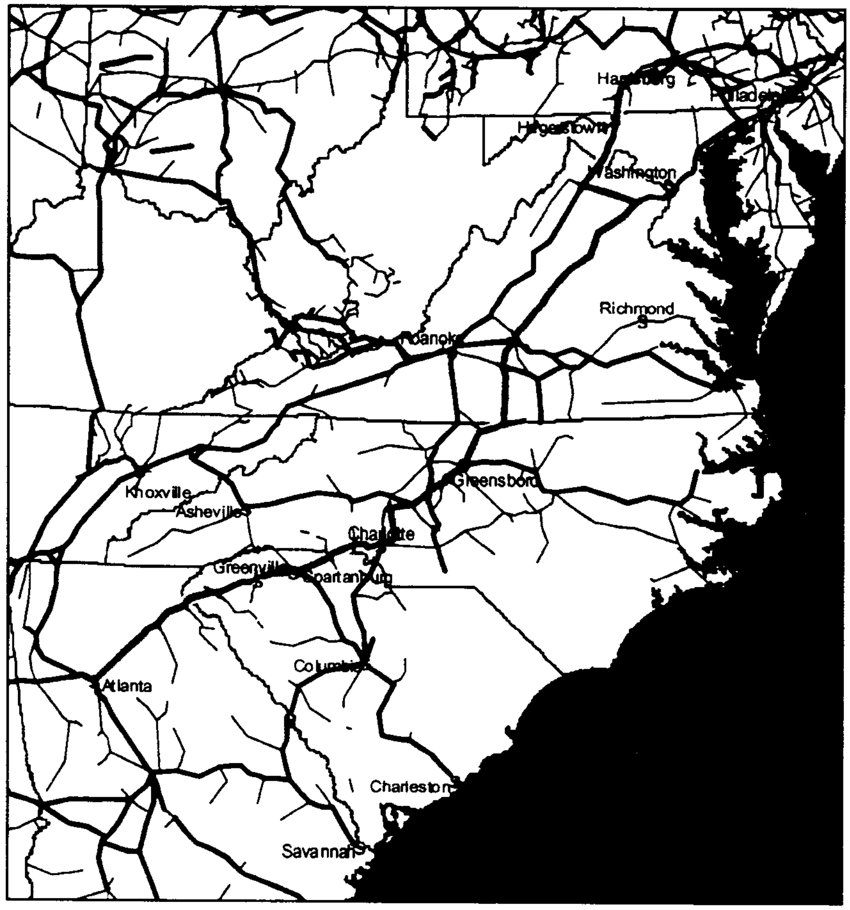


Figure 27

The Piedmont Route is used to connect NS's existing large intermodal hubs in Harrisburg and Atlanta. This Route is sufficiently long that it is now used for conventional TOFC/TOFC service. Moreover, all or portions of the Route could be used for an Expressway-like service if terminal space were available.

Figure 28 shows selected operating characteristics of NS's Piedmont Route as derived from its operating timetables:

- The Route is 788 miles long;

- The Route alternates between one and two main tracks for most of the 604 miles between Manassas and Atlanta; however, north of Manassas for 183.9 miles, or about 23% of the total Route, the Route has only one main track;

- Train Control applies to 703 miles, or about 89% of the total Route, but the remaining 11% of the Route does not have signals.

As shown by Figure 28, the Piedmont Route's maximum current zone speeds for passenger and intermodal service are 79 mph and 60 mph, respectively, for the 604 miles between Manassas and Atlanta. Despite many speed restrictions because of curvature, running speeds without stops Amtrak Trains Nos. 19 and 20 average about 50 mph over the Piedmont Route between Alexandria and Atlanta. North of Manassas to Hagerstown, maximum authorized zone speeds for passenger and intermodal train service are 45-50 mph, also with numerous speed restrictions. Because of its superior location however, we are of the opinion that if it were upgraded, NS's Piedmont Route could produce average intermodal train speeds of approximately 50-60 mph with maximum authorized speeds of 79 mph.

Selected Operating Characteristics of NS Piedmont Route
Harrisburg, PA - Atlanta, GA via Manassas

	Miles	Tracks	Method of Operations	Max. Authorized Zone Speeds PX/IM
Harrisburg-Hagerstown				
CP Capital-CP Ship	40.4	1	TC	50
CP Ship-Hager	34.4	1	TWC	50
Subtotal	74.8			
Hagerstown-Manassas				
Hagerstown-Riverton	58.2	1	TC	50
Riverton-Manassas	50.9	1	TWC	45/45
Subtotal	109.1			
Manassas-Atlanta				
Manassas-Montview	142.0	1-2	TC	79/60
Montview-Salisbury	158.7	1-2	TC	79/60
Salisbury-Greenville	150.8	1-2	TC	79/60
Greenville-Inman Yard	152.4	1-2	TC	79/60
Subtotal	603.9			
Total	**787.8**			

Notes:
(1) Data from NS Timetables
(2) TC means Train Control
(3) TWC means Train Warrant Control

Figure 28

3.3.5.2.1 Existing Intermodal Service On The NS Routes

Between Harrisburg and Atlanta, NS operates the following intermodal facilities that are located on either the Shenandoah or Piedmont Routes:

- Atlanta, GA;
- Charlotte, NC;

- Greensboro, NC;
- Front Royal, VA; and
- Harrisburg, PA.

North of Harrisburg, NS operates three intermodal facilities in the large New Jersey market as well as intermodal facilities in Bethlehem, Morrisville, Taylor, and Philadelphia, PA.

Between Atlanta and the Northeast region, NS offers through intermodal service only on the Piedmont Route. Premium COFC/TOFC service is provided by a single through train operating over the Piedmont Route between Atlanta, Harrisburg, and Croxton, NJ, NS's primary terminal in the New Jersey area.

Principal users include postal and express, third party, trucking and some maritime companies.

Trains between Memphis and Atlanta provide connecting traffic to this premium Piedmont Route train. Although NS believes that there is significant traffic potential for highway diversion to intermodal service through the Meridian, MS Gateway that would be preferred to its current use of the Memphis Gateway, Kansas City Southern Railway's (KCS) unreliable service has prohibited the development of this traffic.

NS's premium intermodal train schedules between Atlanta and Croxton are about 29.5 hours over the 969-mile route in either direction, including a one hour stop at Greensboro to pick-up and set-out traffic. Between Croxton, NJ and Atlanta, GA, their average speeds are about 34 mph. North of Manassas, however, average train speeds are a slower-than-average 29 mph, while south of Manassas to Atlanta, average train speeds are a higher- than-average 39 mph.

Elsewhere on the Piedmont Route, NS operates a pair of intermodal trains between Atlanta, GA and Alexandria, VA primarily for UPS traffic. NS also operates a pair of trains between Atlanta, GA and E-Rail, NJ that handle primarily maritime traffic on schedules that are about 10% longer than its Atlanta-Croxton schedules. Another pair of NS intermodal trains operates between Norfolk and Detroit, using a portion of the Piedmont Route between Lynchburg, VA and Harrisburg, PA. Other intermodal services operate over a portion of the Piedmont Route between Lynchburg, VA and the Virginia Inland Port near Front Royal, VA.

NS's Piedmont Route trains have experienced significant growth since NS's absorption of its portion of Conrail, and NS projects continuing growth in future years. According to NS, north/south traffic growth has been among the fastest segments of total NS intermodal traffic and represents a substantial portion of the firm's targeted long-term growth. As a result, NS projects the addition of one pair of intermodal trains on the Piedmont Route within the next five years, and the addition of two more pairs of intermodal trains within the next ten years.

It is also NS's objective to add one intermodal TOFC train in each direction north of Alexandria, VA in the NEC, and NS states that negotiations are underway with Amtrak and SEPTA (Southeastern Pennsylvania Transportation Authority) to permit such service to occur. If successful, we estimate that NS's train schedules between Atlanta, GA and Croxton, NJ could be reduced by some four to six hours, or between 15% and 20%. Note however, that the NEC is not double stack cleared, and cannot be cleared, so that intermodal train service in the NEC will always be restricted to TOFC service only.

Although NS has used portions of the Shenandoah Route for intermodal service in previous years, its slower allowable speeds have caused all intermodal trains to be shifted away to the Piedmont Route and others at this time. There is no change projected in this NS policy.

3.3.5.2.2 Application to the Market Study and Diversion Model

Rail-highway competition is usually expressed in terms of the transit times, reliability, and cost of the two modes. Reliability and cost differentials between the two modes have been addressed in the interview and survey portions of this Market Study, as well as in the Diversion Model.

With regard to transit time, we found that the average speed of NS's premium intermodal train schedule between Atlanta and Croxton is about 34 mph, performance that is some 11 mph lower than the average 45 mph that truckers can achieve on parallel Interstate System highways. Accordingly, for substantial diversion of highway traffic to rail to occur, it is apparent that NS's average train speeds must be increased so that its transit times will be competitive with truck.

Figure 29 shows a comparison of NS and truck transit times by length of haul that would be required in order for NS transit times, including terminal times, to be equal to truck. Figure 29 accepts truck average speeds of 45 mph, and compares that to NS's current average linehaul speeds of 34 mph, and then adds Expressway-like minimum terminal times of 2.5 hours to the NS linehaul times. As shown by Figure 29, at current average speeds, NS transit time as a percent of truck ranges from a low of 144% and a 9.7 hour disadvantage on a 22.2 hour truck transit time for a 1,000 mile length of haul to a high of 161% and a 5.4 hour disadvantage on an 8.9 hour truck transit time for a 400 mile length of haul.

In order to determine the linehaul average speeds for NS's total transit time to equate to truck transit time for each length of haul, Figure 29 also provides terminal and allowable linehaul speeds for NS. As shown by Figure 29, NS's required average linehaul speeds would be as follows:

- For a 400 mile haul, 63 mph
- For a 600 mile haul, 32 mph
- For a 800 mile haul, 34 mph
- For 1,000 mile haul, 28 mph.

Comparison of NS and Truck Transit Times

	Length of Haul			
	400 mi	600 mi	800 mi	1,000 mi
Truck Transit Time @ 45 mph	8.9 hr	21.3 hr	25.8 hr	38.2 hr
NS at Current Average Speeds:				
Terminal Time (Min)	2.5 hr	2.5 hr	2.5 hr	2.5 hr
Linehaul @ 34 mph	11.8	17.6	23.5	29.4
Total NS Transit Time	14.3 hr	20.1 hr	26.0 hr	31.9 hr
NS vs. Truck Transit Time:				
Hours NS exceeds Truck	5.4 hr	(1.2) hr	0.2 hr	(6.3) hr
NS as a Percent of Truck	161%	94%	101%	83%
NS at Competitive Average Speeds:				
Terminal Time	2.5 hr	2.5 hr	2.5 hr	2.5 hr
Allowable Linehaul Time	6.4	18.8	23.3	35.7
Required NS Transit Time	8.9 hr	21.3 hr	25.8 hr	38.2 hr
Required Average NS Train Speeds	63 mph	32 mph	34 mph	28 mph

Notes:
(1) Truck Transit Times assume a single driver meeting log requirements for 10 hours driving, 8 hours not driving, and 6 hours driving in any 24 hour period.
(2) Minimum NS Terminal Time of 2.5 hours is based on Expressway's 1.5 hour cut-off time before train departure, and 1.0 hour time before trailer availability after train arrival.

Figure 29

Our conclusion is that if substantial diversion of traffic from trucks to NS is to occur in this corridor, NS's average train speeds need to be increased to approximately 60 mph, or 15 mph faster than average truck speeds of 45 mph, in order to offset the minimum projected. terminal time. To do so would require significant track upgrading as well as increasing NS's maximum authorized speed for intermodal trains to as much as 79 mph, comparable to its existing maximum allowable speed for passenger trains.

Potentially, without considering potential upgrading costs and feasibility, either NS's Shenandoah or Piedmont Route could be competitive for the highway tonnage flows that are moved on the generally parallel Interstate System Highways through Virginia. Accordingly, the Diversion model has considered that both NS routes would be available for intermodal service, despite the physical advantages and disadvantages of each. However, the gradations of achievable transit times, reliability, and costs of the two alternative NS routes have been reflected in the Diversion Model in order to best assess the potential attraction of highway traffic to both the Shenandoah and Piedmont Routes

4 Diversion Scenarios

4.1 Base Case

The Base Case Scenario is designed to provide a passive "floor" against which the impact of more active or aggressive scenarios are judged. In the case of the Virginia I-81 Project, the Base Case reflects the "do nothing" alternative. Rather than assessing **any** investment in highway or rail infrastructure on the part of the public or private sector, it assumes a continuing and constant relationship of investment across and between all modes. In essence, the Base Case assumes that mode shares are maintained throughout the study period.

While these assumptions seem implausible, they are necessary to isolate and measure the impact of the changes reflected in alternative scenarios.

In the Reebie Division Analysis Model, Base Case values are embedded in calculations. The model requires an adjustment – positive or negative – to justify a change in modal share. Thus for each lane of analysis, a Base Case relationship between truck and rail intermodal costs is established and changes in service, cost, or technology can be introduced to provide modal shifts.

In the I-81 Corridor Analysis, base truck and rail intermodal costs were developed using Reebie Associates Costline Products[1]. As the introduction of improved conventional and new unconventional rail intermodal services changes the menu of products available to shippers so the distribution of traffic among modes and services will adjust to a new equilibrium. The measure of this change reflects the market place impact of the new services. Thus these 'deltas' can be used to analyze mode and activity shifts, VMT[2] impacts, revenue redistribution and logistics cost savings.

4.2 Alternative Scenarios

In addition to the Base Case the three alternative scenarios were developed with significant input from Norfolk Southern and from DRPT. They include preliminary selection of route, intermodal terminal networks (including new and existing terminal locations), intermodal technology, and operating characteristics.

Utilizing the results of the Shipper and Carrier Survey and Interview processes, and incorporating the feedback from Norfolk Southern, we developed a unique set of markets for each scenario that can be modified by adding tolls or taxes, slowing the service of over-the-road carriage, or changing the marketplace dynamics in numerous other ways. Additional refinement of these scenarios will be completed in Task 7, and may include additional items such as track construction or signaling improvements.

1 A complete description of Reebie's Costline Products appears in Appendix 2

2 Vehicle Miles Traveled – A common measure of highway activity

For each of the three alternative scenarios, we developed preliminary service and cost characteristics as they apply to all markets that may be affected by the proposed improvements. These have sought to take into account train frequencies, transit times, dray distances, lift on/lift off times, and the costs associated with each. The operational effect of program improvements has been translated into improvements in competitive performance. These performance changes are used as a basis to project the diversion of traffic. The features of the three alternative scenarios are outlined below.

4.2.1 Scenario 1

4.2.1.1 Route Selection

Scenario 1 seeks to identify the potential to divert highway traffic from I-81 Norfolk Southern's Shenandoah Route. This scenario contemplates the operation of Iron Highway or Expressway-style service from points south of Knoxville, TN to Bristol and Roanoke, joining the Piedmont Line at Lynchburg, VA, and thence to Harrisburg, PA via Manassas and Hagerstown. South of Knoxville, separate trains would operate to New Orleans and Memphis.

From Knoxville north, the rail route generally parallels I-81. Previous studies conducted by NS suggest that substantial upgrading of the rail route would be required in order to obtain highway-competitive speeds, including the installation of improved signaling on about 22% of the total rail route.

4.2.1.2 Included Terminals

The intermodal terminals included in this analysis include both current terminals at Memphis, Harrisburg, Croxton, Huntsville and new Expressway-Style intermodal terminals at Manassas and Roanoke, Virginia and Meridian, MS.

Scenario 1 – Included Terminals
• New NS Manassas, VA Terminal (Expressway Only)
• New NS Roanoke, VA Terminal (Expressway Only)
• NS Croxton, NJ Yd TOFC/COFC
• NS Harrisburg, PA TOFC/COFC
• NS Huntsville, AL (Irondale) Norris Yd TOFC/COFC
• NS Knoxville, TN Sevier Yd TOFC/COFC
• NS Memphis, TN Forrest Yd TOFC/COFC
• New NS Meridian, MS (Expressway Only)
• NS New Orleans, LA Oliver Yd TOFC/COFC

4.2.1.3 Operations Summary

Train operations would center on Knoxville where northbound trains would be combined for advance to Harrisburg, PA and points east, and southbound trains would be split for New Orleans and Memphis. North of Knoxville, trains would make "set-offs"[19] at a new terminal in Roanoke, a new terminal at Manassas, and the existing terminal in Harrisburg, terminating at Croxton, NJ.

South of Knoxville, trains would operate to New Orleans and Memphis. New Orleans-bound trains would handle traffic moving to a new terminal at Meridian, MS and terminate at the existing NS ramp in New Orleans, delivering traffic locally and to points further west in Eastern Texas. Memphis trains would handle traffic to Huntsville, AL in addition to terminating traffic at Memphis for the local market and points beyond.

4.2.2 Scenario 2

4.2.2.1 Route Selection

Scenario 2 seeks to identify the potential to divert highway traffic from I-81 Norfolk Southern's Piedmont Route. This scenario contemplates the operation of Iron Highway or Expressway-style service in addition to an improved conventional TOFC/COFC service from Atlanta, GA and points south and east to Harrisburg, PA and points east.

The rail route used in this Scenario would be from Jacksonville, FL to Atlanta, thence north to Charlotte and Greensboro to Manassas along NS's former Southern Railway, Piedmont Division Main Line. Unlike the Shenandoah route, this NS Line offers a higher-capacity, higher-speed route than is currently available on NS's former N&W main line through Bristol and Knoxville. However, although maximum current speeds on the Piedmont Division Main Line are 79 mph for passenger trains and 60 mph for intermodal trains, NS has indicated that some upgrade would be required to obtain highway-competitive speeds. More extensive investment, including improved signaling systems, would be required in order to obtain highway-competitive speeds on the 184 mile line segment north of Manassas Junction.

4.2.2.2 Included Terminals

The intermodal terminals included in this analysis include both current terminals at Miami, FL; Dallas, TX; Jackson, MS; Beaumont, TX; Alexandria, VA; Atlanta, GA; Baltimore, MD; Charleston, SC; Charleston, SC; Charlotte, NC; Norfolk, VA; Croxton, NJ; Greensboro, NC; Greenville, SC; Harrisburg, PA; Huntsville, AL; Jacksonville, FL; Memphis, TN; Morrisville, PA; New Orleans, LA and Savannah, GA and new Expressway-Style intermodal terminals at Manassas, VA and Reevesville, SC.

19 "Set-off" is the railroad term commonly applied to the process of dropping a car or group of cars either for customer loading/unloading or for subsequent pick-up by another train for continued movement. In this case, of the cars set-off in Knoxville, some would move further south, some further west, and some unloaded immediately at the NS intermodal ramp in Knoxville, TN.

Scenario 2 – Included Terminals
• FEC/NS Fort Lauderdale, FL TOFC/COFC
• KCS Dallas, TX (Zacha Jct) TOFC/COFC
• KCS Jackson, MS TOFC/COFC
• KCS Port Arthur (Beaumont), TX TOFC/COFC
• New NS Manassas, VA Terminal (Expressway Only)
• New Reevesville, SC (Expressway Only)
• NS Alexandria, VA TOFC/COFC
• NS Atlanta, GA Inman Yd TOFC/COFC
• NS Baltimore, MD TOFC/COFC
• NS Charleston, SC TOFC/COFC
• NS Charlotte, NC TOFC/COFC
• NS Chesapeake, VA Portlock Yd TOFC/COFC
• NS Croxton, NJ Yd TOFC/COFC
• NS Greensboro, NC TOFC/COFC
• NS Greenville, SC TOFC/COFC
• NS Harrisburg, PA TOFC/COFC
• NS Huntsville, AL (Irondale) Norris Yd TOFC/COFC
• NS Jacksonville, FL TOFC/COFC
• NS Memphis, TN Forrest Yd TOFC/COFC
• NS Morrisville, PA TOFC/COFC
• NS New Orleans, LA Oliver Yd TOFC/COFC
• NS Savannah, GA TOFC/COFC

4.2.2.3 Operations Summary

Train operations would consist of conventional TOFC/COFC feeder services from points in the southeast accumulating traffic to Atlanta and Charlotte, where traffic would proceed north through Greensboro, and Manassas. At Manassas, trains would split to eastern points such as Alexandria and Baltimore, or northern points such as Harrisburg, Morrisville, and Croxton. Southbound conventional TOCF/COFC trains would operate to Charlotte, where they would be integrated into existing train service to points south such as Atlanta and Jacksonville; New Orleans and points on the KCS including Dallas, Beaumont, and Jackson; Huntsville; Charleston and Savannah . Overlaid upon the conventional intermodal network, is an Expressway-style service connecting many of these same points (including operations over FEC, but not KCS) , and adding Expressway-style terminals in Manassas, VA and Reevesville, SC.

4.2.3 *Scenario 3*

4.2.3.1 *Route Selection*

Scenario 3 seeks to identify the potential to divert highway traffic from I-95 via CSX's Seaboard Route. This scenario contemplated train movements from Jacksonville to Savannah and Charleston, North through Richmond and Washington, DC to Terminals in Baltimore, Philadelphia, Northern New Jersey, and terminating in Albany, NY.

4.2.3.2 *Included Terminals*

The intermodal terminals included in this analysis include both conventional intermodal terminals at Atlanta, GA; Baltimore, MD; Charleston, SC; Jacksonville, FL; Little Ferry, NJ; Miami, FL; Orlando, FL; Philadelphia, PA; Savannah, GA; Tampa, FL and Worcester, MA, and new Expressway-style terminals in Albany, NY; Richmond, VA and Florence, SC.

Scenario 3 – Included Terminals
• New CSXI Albany, NY (Expressway Terminal)
• CSXI Atlanta, GA Yd TOFC/COFC
• CSXI Baltimore, MD TOFC/COFC
• CSXI Charleston, SC TOFC/COFC
• New CSXI Florence, SC Terminal
• CSXI Jacksonville, FL TOFC/COFC
• CSXI Little Ferry, NJ TOFC/COFC
• CSXI Miami, FL TOFC/COFC
• CSXI Orlando, FL TOFC/COFC
• CSXI Philadelphia, PA TOFC/COFC
• New CSXI Richmond, VA (Expressway Terminal)
• CSXI Savannah, GA TOFC/COFC
• CSXI Tampa, FL (Uceta) Yd TOFC/COFC
• CSXI Worcester, MA TOFC/COFC

4.2.3.3 *Operations Summary*

Train operations would consist of enhanced conventional TOFC/COFC feeder services from points currently serviced by CSXI trains. Southbound conventional TOCF/COFC trains would operate to Yemassee, SC where trains to Atlanta leave the Seaboard line, and trains to Florida continue to Jacksonville and points south. Overlaid upon CSXI's current TOCF/COFC intermodal network, is an Expressway-style service connecting the major markets (including a new terminal in Florence, SC) of the Southeastern coast – already served by CSXI – with the existing terminals in the Mid-Atlantic and Northeast, and adding Expressway-style terminals in Richmond, VA and Albany, NY.

5 Diversion Model Methodology

The great majority of freight travels only a short distance, and is thus not conducive to intermodal transportation. Likewise, many freight movements occur in volumes and at frequencies not generally appropriate for intermodal service. Additionally, many freight movements, by the nature of the commodities shipped (examples: bulk chemicals or asphalt), are also not conducive to intermodal transport. In the course of our analysis, we developed a series of tests to identify those lanes, which by virtue of their commodity, distance, density, geography and circuitry, would be positively impacted by hypothetical improvements in the rail intermodal rate and service calculus.

Intermodal market penetration is a function of two primary factors: (1) relative length of haul and (2) concentration of volume in traffic lanes. As the distance between the origin and the destination increases and lane volume (density) grows, intermodal service becomes more competitive relative to highway, and its cost advantage increases. A statistical interpretation of this principle underlies the Reebie Associates' Diversion Model that was employed to estimate the diversion of traffic to rail intermodal for the selected corridors in the Virginia I-81 Corridor Analysis.

Reebie's quantification of the potential shifts of freight traffic from highway to rail intermodal service is centered on an evaluation of specific individual traffic lanes (one origin linked to one destination). The lanes were selected based on projections for improved intermodal service resulting from hypothetical investments in infrastructure, the volumes of highway traffic and the potential of such traffic to contribute to intermodal train volumes, and the likelihood that diversions would be successful.

Our assessment of potential rail intermodal gains from these lanes employs a series of tools and techniques, developed by Reebie Associates and used in ICC and STB proceedings to assess the potential traffic gains from rail network investment. This assessment involves weighing competitive alternatives against the rail intermodal offerings brought to market by changes in rail operating cost. In particular, we determined the relative changes in modal shares that would result from the changes in costs and service arising from the benefits of proposed investments on a lane-by-lane basis.

We examined current modal shares and then correlated those to the underlying changes in the rail carriers' estimated operating costs. We also examine service competition to assure that the new intermodal service offering would meet or exceed market standards.

Recognizing that rail-truck intermodal traffic increasingly operates between hub centers (usually located in or near major metropolitan areas), our study methodology takes into account the fact that intermodal facilities located in some cities could economically be used to reach other metropolitan markets outside of those immediate areas, even some distance from the terminal. Such a long "reach" would require the use of an extended dray, but this is not uncommon, particularly as part of a long rail line-haul movement.

5.1 *Data & Model Preparation*

The purpose of examining O-D flows in detail is twofold: (1) it identifies the underlying market demand for the products moving across a given highway segment and (2) it helps determine the availability of rail carload and intermodal facilities in the actual originating and terminating markets The O-D's included in this analysis include some of the largest transportation markets in the nation, such as Boston, New York, Philadelphia, Atlanta, Houston, and Dallas. These large market players are external to Virginia, and suggest a need to coordinate any large improvement efforts with neighboring States such as Tennessee and Pennsylvania, and beyond. Without a joint effort, no real ability exists to convert traffic from truck to rail.

5.1.1 ***Commodity mix of Traffic***

The characteristics of the transported commodity represent a significant consideration in the "divertability" of that traffic to rail carload or rail intermodal service. Heavy or bulky commodities are dominant for rail carload services, while moderate value and non-perishables are more susceptible to rail intermodal diversion. These broad categorizations are not without flaws however. For example, Asphalt Coatings (STCC 2952) would ordinarily not be considered an intermodal divertable commodity, but approximately 10% of asphalt coatings are transported in pails and bags for shipment to home centers and lumberyards. While generally not moved over long distances, the limited perishability of the bagged product permits movements in excess of 500 miles – clearly offering an opportunity for intermodal. Commodity data also provides a strong correlating factor to equipment type. The identification of commodities for dry-vans, the predominant rail intermodal vehicle, is vital to understanding the divertability of highway traffic to rail for intermodal.

To determine the amount of dry-van transportation as a portion of the total, Reebie Associates has developed a statistical algorithm or "screen" which when applied to specific commodity volumes will yield a subset volume that approximates dry-van tonnage. For the Virginia corridor, we applied this model to calculate that traffic which could be diverted to traditional rail intermodal Trailer-on-Flat-Car (TOFC) and Container-on-flat-Car (COFC) services.

Of the total traffic moving in Virginia's Corridor, 70% of the traffic is dry-van versus 30% which would likely move in bulk-type, flatbed, refrigerated or tank-type transport vehicles.

5.1.2 ***Mileage between O-D Pairs***

It is generally accepted that intermodal traffic is most competitive in longer lengths of haul – primarily those over 700 miles. Intermodal participation is less than 3% for all van shipments of less than 500 miles, and is negligible for local movements. In lanes of less than 500 miles, conventional intermodal products are generally not considered competitive. Reebie has however, conducted several analyses that suggest that intermodal can be competitive in shorter lengths of haul, given an appropriate set of circumstances. These circumstances can include (1) the circuity of the combined drayage and rail line-haul versus the available highway alternative, and, (2) the density of the corridor (as measured by tons or truckloads of divertable freight). In circumstances where rail intermodal circuity is low, and where lane density is high, railroads have been successful in carving out niches of traffic in corridors of less-than 500 miles. CP's Expressway model is offering competitive service between Toronto and Montreal – a distance of 540 miles, and between Toronto and Detroit – a distance of 380 miles. These short distances suggest that under some circumstances, rail intermodal services can be competitive compete in short although unusual For this analysis, we analyzed traffic moving on the study corridors over distances greater than 350 miles.

In addition to the selection of lanes, several other steps are necessary in preparing the diversion model, including the assignment of traffic to existing or new serving facilities, and the development of competitive drayage cost information.

5.1.3 ***Identification of Analysis Lanes***

Having selected a series of lanes for the target analysis, we first accumulated the traffic from each BEA to the national rail intermodal network ramp that would most appropriately service that region. The assignments were made based on geographic proximity, and the directional flow of current and potential traffic volumes. Second, we accumulated the traffic lanes (market to market pairs) into ramp-to-ramp corridors. The corridors were then individually analyzed to determine if sufficient density existed to support intermodal operations. This involved calculating the daily intermodal loads generated between the ramp pairs based on 15 tons per load, and 300 days per year

5.2 *Define Competitive Service Offerings*

The operating characteristics of current and new transportation service offerings will be quantitatively specified. We will capture the features of over-the-road motor carriage, as well as of existing service by railroads active in the markets under consideration. These services will be contrasted with the new product offerings, as outlined in the Task 4 scenarios and further refined by Norfolk Southern here in Task 5. Specifications will extend to equipment utilization and repositioning; transit times, frequency, and cutoffs; trains sizes and speeds; and terminal handling, availability times, blocking, and intermediate transfers. The railroad elements we expect will be available from NS.

5.3 Competitive Costing

Reebie Associates CO$TLINE models were used to prepare estimates of the railroads' and motor carriers' costs of shipping goods over the study corridors in the state of Virginia. These costs are necessary inputs into the Reebie Diversion Model, which was used to determine how much motor carrier traffic that an improved railroad could capture.

Developing these costs required the following steps:

1. Identify the origins and destinations of all the traffic moving over the corridor.

2. Determine the railroads that could serve these origin-destination pairs on an intermodal basis.

3. Determine the highway miles that would be traversed by a motor carrier serving that origin-destination pair.

4. Determine the railroad routing (names of railroads and miles on each) that would be involved in providing competing intermodal services.

5. Determine the cost of providing service on each mode using Reebie Associates' CO$TLINE product.

6. Estimate the amount of traffic diverted off the highway using Reebie Associates' diversion model.

This document will describe methods used in performing step #5 in the preceding list.

5.3.1 ***Rail Costs***

As the number of origin-destination pairs is extremely large in this analysis, the Consultant Team utilized the rail CO$TLINE model, the Rail Cost Analysis Model (RCAM), in a linear fashion. That is, the costs produced by RCAM depend linearly on distance. So, it is possible to prepare a straight line showing the cost of shipping by rail depending on the length of haul. This linear relationship is valid, though, only for each railroad separately. Since there were ten railroad combinations involved, a linear cost profile was developed for each of the participating railroads.

The actual costs for each origin and destination ramp pair, were developed, based on the appropriate combination of carriers and the relative rail mileage for each carrier in the ramp-to-ramp operation. NS reviewed the railroad cost factors prior to their adoption for the costing analysis. Rail miles for each carrier were developed using Reebie Associates Rail Network Model.

5.3.2 ***Truck Costs***

Truck costs do not perform in a linear fashion. Rather, certain costs are time based(such as trailer lease costs), while others are mileage based (such as driver wages), some are regionally based (such as fuel taxes), and still others are load based (such as overhead). The combination of these costs create a stair-step cost profile that is not compatible with linear or expoential analysis. Therefore, for this analysis, truck costs were determined for distances from 300 to 3050 miles in 50-mile increments. This set of costs was developed for each of the following five types of trucks: dry van, tank, hopper, flat bed, and reefer. These costs were then applied based on the average highway mileage between the actual origins and destinations in the lane.

The cost of current and new operations was established on a door-to-door basis for railroad and over-the-road transportation. The operating characteristics defined in the previous step will become inputs into Reebie Associates Carrier CostLine models, which establish modal costs per unit by lane. These models are specific to individual railroads and classes of motor carrier.; alternately, NS may prefer to generate its own costs, although we are not dependent on them doing so. Some items like handling costs in new facilities will need to be researched, or to come from Norfolk Southern.

5.3.3 ***Diversion Analysis & Reiteration***

The diversion model will be applied across the range of product scenarios to estimate their payoffs in captured traffic. It will winnow opportunities, dropping some markets from active consideration and highlighting others. Output will be reiterated to align preliminary operating profiles with diverted volumes, and to test the productivity of various modifications to service specifications. Results will be reviewed with Norfolk Southern and checked against survey findings, to confirm their reasonableness and potentially to blend in the stated plans of particular large customers.

We applied the diversion model only to those O-D pairs that first passed two competitive hurdles. The first hurdle was based on service, the second on cost.

Service Hurdle: To meet the service hurdle, new intermodal service must be competitive with over-the-road truck delivery on a door-to-door basis. For the Virginia I-81 Corridor Analysis, we utilized national average rail intermodal service performance metrics to assess the competitiveness of the proposed service. We subsequently added hours for drayage (the truck movement between the rail terminal and the customer dock), considering distance, local and linehaul drive time, loading and unloading. We combined this with an allowance for terminal time, and arrived at an estimated transit time and schedule for total intermodal service door-to-door. The final door-to-door rail intermodal schedules were then compared to over-the-road truck service. If the rail service for a given lane was within one transit day of the comparative truck service, the lane passed the service hurdle. Lanes that passed the service hurdle would then be evaluated against the cost hurdle before any diversion was allowed.

We retested lanes that initially failed the service threshold by allowing one additional day for rail service, but reduced diversions from such lanes by 70% to recognize the diminished ability of rail carriers to divert traffic in such a lane. This percentage adjustment (based on information developed independently by Reebie from industry sources) is meant to reflect the carrier's reduced ability to capture baseload or weekday traffic, and instead capture only weekend or overflow traffic volumes. Lanes meeting this criterion passed the service hurdle for 30% of the available highway volume. We did not predict any diversions for lanes that failed both hurdles. Lanes that did not meet the service hurdle generally suffered from circuitous rail mileage, low lane density, or both factors.

Cost Hurdle: To meet the service hurdle, new door-to-door intermodal costs must be lower than over-the-road truck costs, and lower than current intermodal costs. Unless the new service can offer an advantage to shippers relative to the next best alternative, the elasticity model suggests that shipper behavior is unaffected. We did not divert traffic for any lane that failed this test.

We constructed rail costs from individual carrier long-term variable costs plus a profit margin. We added drayage individually estimated for each lane pair to produce a total door-to-door cost. We used a similar methodology for calculating competitive highway costs, by adding a representative profit margin. We utilized an average 91.5% operating ratio (which is the ratio achieved by the body of efficient motor carriers whose composite expense profile was used by us to generate over-the-road costs) in calculating the profit margin. This cost-plus-profit factor established the full cost in each lane.

We set rail margins at 130% over variable costs. The rote application of this margin, however, could produce a diversion in the higher volume (headhaul) direction that would be substantially larger than the diversion in the lower volume (backhaul) direction, thus creating a potential traffic imbalance. Accordingly, in backhaul lanes, where market prices may in reality be substantially reduced by carriers versus the headhaul direction in order to address such potential traffic imbalances, we set rail margins at 110% for both old and new rail costs. For the same reason, highway costs were lowered in the backhaul direction.

5.3.4 Testing Market Elasticity

The elasticity model that underlies Reebie's Diversion Model, implicitly accounts for the whole range of distribution cost and service considerations necessary for customers to use intermodal over highway service. We check diversions resulting from the model against total train volumes, including base load volumes and rail-to-rail diversions, to ensure the adequacy of traffic levels to sustain dependable rail service.

We interpret the relationship of intermodal/highway cost and share in terms of elasticity, meaning that a change in cost for a mode will produce a corresponding change in its market share. Based on that association, we use a cross-elasticity analysis to predict diversions across modes. Specifically, the elasticity measurement is a statistical coefficient by which we can quantify the effect of change in the intermodal cost on the demand for highway service.

Transportation researchers routinely apply discrete choice models to measure elasticity in mode selection. Our analysis adopts modal share as the dependent variable, since share supplies a comparable measure of modal activity for business areas differing in traffic volume. To estimate elasticity where the variable is modal share, the model must restrict results to values between 0% and 100%, in effect estimating the probability of customers selecting intermodal transportation over highway, given some independent attribute. The selected attribute is the difference in average cost between intermodal and highway. In sum, the model measures the elasticity of intermodal share with respect to the difference between highway and intermodal costs, following a logit design. The model enables us to predict, with some measure of reliability, how intermodal share will change when operating costs are changed.

For those O-D pairs passing the service and cost hurdles, we determined diversions in four steps:

1. Categorize lane density;

2. Calculate the change in differential between old rail costs versus highway and new rail costs versus highway;

3. Multiply the change in differential by the relevant coefficient from the market share model; and

4. Apply the multiplied differentials to present intermodal market share, yielding the new intermodal share of the market and the volume diverted.

This last step produces an estimate of rail intermodal diversions from highway. In applying the diversion model to individual lanes, however, a limited set of modifications is required. First, recognizing that there are practical limits on the volumes of traffic that can move via intermodal service, we capped intermodal share at 90%. We diverted no traffic in lanes where the current share already exceeded the cap.[20]

Second, we capped intermodal share gains at a 15% increase, but allowed up to a 20% increase in the backhaul direction of each lane. This better balances backhaul with headhaul diversions, where the available volume is higher. The cap reflects our judgment as to the outer limit of diversions likely to occur in a three-year time frame, absent technological innovation.

Third, where current rail intermodal market share was below 4%, we substituted a floor value based on truck types of between .005 and 6.0 %, seeking to incorporate the results developed from the shipper and motor carrier surveys and interviews, and other research materials. This practice of "seeding" traffic volume is consistent with our work in prior diversion analyses and reflects a conservative procedure: even in light density lanes, intermodal market share averages 9% at distances over 500 miles.

5.4 Modifications to Diversion Model for Virginia

For the Virginia analysis, we adapted the diversion model to permit the analysis of impacts based on prospective changes in motor-carrier or railroad intermodal operation costs. We also adjusted the model to permit transit-time adjustments (for the rail intermodal and motor carrier alternatives) to influence modal diversion potential.

In addition, we captured the "Interstate highway miles" for each lane so as to target diversions in corridors that provided the greatest VMT impact for the I-81 Corridor, and to assess the impacts on other study routes such as I-95, I-77 and I-64.

To estimate operating cost changes that might be achieved with public sector investment or policy adjustments, we isolated those cost components that could reasonably be influenced by infrastructure or operational changes. These included time-based items such as trailer/container base and ownership costs, terminal investment (financing) and amortization costs, locomotive amortization costs, car-hire costs and terminal operating costs. We elected not to make adjustments to activity-based cost components such as right-of-way maintenance; dispatching and operation oversight costs or equipment maintenance costs. It was perceived that the impact of investment or policy change on these costs would probably be minimal apart from the changes in activity that might occur as a result of increased traffic levels in one mode or another.

[20] This is a standard feature of the model, and has been supported in previous analyses including those conducted for STB filings and has been supported by discussions with rail intermodal marketing executives.

The "Adjustable" portion of the costs represented over 70% of total operating costs.

We then selected a series of cost reduction and service improvement percentages to analyze the changes in modal share resulting from these changes. For the I-81 Corridor analysis, we selected 10%, 15% and 25% as inputs for this portion of the analysis. These figures were fed into the model in terms of price reductions and service improvements for each scenario to determine what impact these adjustments would make in the allocation of market shares. The results of that analysis for each of the three alternative scenarios appears below. Figure 30and Figure 31 reflect the results of Scenario 1, while the results from Scenario 2 and 3 are shown in Figure 32-Figure 35. It should be noted that the alternatives scenarios overlap to a small degree. It is estimated that this overlap represents less than 10% of the total results such that the combined impact of all scenarios can be interpreted as the total diversion potential – based on the outlined service and cost changes – for the study corridors. Similarly, the VMT impacts would be additive, recognizing the previously mentioned overlap.

Scenario 1	10% Cost Reduction	15% Cost Reduction	25% Cost Reduction	10% Speed Improvement	15% Speed Improvement	25% Speed Improvement	25% Cost, 10% Speed Improvement
Cost Adjustment	-10%	-15%	-25%	0%	0%	0%	-25%
Service Adjustment	0%	0%	0%	-10%	-15%	-25%	-10%
Annual Loads Diverted	86,331	109,163	139,646	60,594	64,114	67,968	177,516
Percent of Daily HWY Loads	1.6%	2.0%	2.6%	1.1%	1.2%	1.3%	3.3%
Daily Diverted Loads	287.8	363.9	465.5	202.0	213.7	226.6	591.7
Diverted I-81 VMT (Millions)	26.5	33.3	42.4	18.7	19.8	21.0	54.2
Diverted I-95 VMT (Millions)	0.1	0.1	0.1	0.0	0.0	0.0	0.1
Diverted I-64 VMT (Millions)	2.7	3.4	4.4	1.9	2.0	2.1	5.6
Diverted I-77 VMT (Millions)	0.8	1.0	1.3	0.6	0.6	0.6	1.6
Diverted TOTAL VMT (Millions)	30.1	37.8	48.2	21.2	22.4	23.8	61.5

Figure 30

It should also be noted that this analysis does not propose to analyze the impact of any particular investment or policy, but rather on overall impacts based on a menu of investment or policy changes that <u>result</u> in operating cost improvement or deterioration based on the investment or policy alternatives.

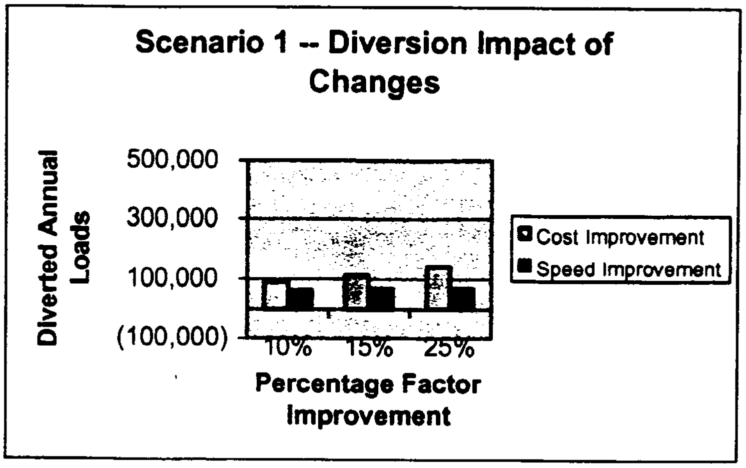


Figure 31

Similarly, the analysis measures modal diversion estimates based on historical national distributions. A more realistic diversion estimate for the Virginia corridor would require an analysis of the regional distributions of intermodal and highway traffic and the specific operating cost improvements attributable to a particular investment or policy alternative. This type of analysis is precisely the goal of the optional Task 7 proposed for this project.

Scenario 2	10% Cost Reduction	15% Cost Reduction	25% Cost Reduction	10% Speed Improvement	15% Speed Improvement	25% Speed Improvement	25% Cost, 10% Speed Improvement
Cost Adjustment	10%	15%	25%	0%	0%	0%	25%
Service Adjustment	0%	0%	0%	10%	15%	25%	10%
Annual Loads Diverted	237,123	305,223	423,198	116,665	124,368	133,463	478,294
Percent of Daily HWY Loads	4.4%	5.7%	7.9%	2.2%	2.3%	2.5%	8.9%
Daily Diverted Loads	790.4	1,017.4	1,410.7	388.9	414.6	444.9	1,594.3
Diverted I-81 VMT (Millions)	44.5	57.1	77.9	23.5	25.0	27.1	92.5
Diverted I-95 VMT (Millions)	10.3	13.3	19.0	4.8	5.1	5.4	20.1
Diverted I-64 VMT (Millions)	5.0	6.5	8.9	2.6	2.7	3.0	10.4
Diverted I-77 VMT (Millions)	2.9	3.8	5.2	1.2	1.3	1.4	5.7
Diverted TOTAL VMT (Millions)	62.8	80.7	111.0	32.1	34.1	36.8	128.7

Figure 32

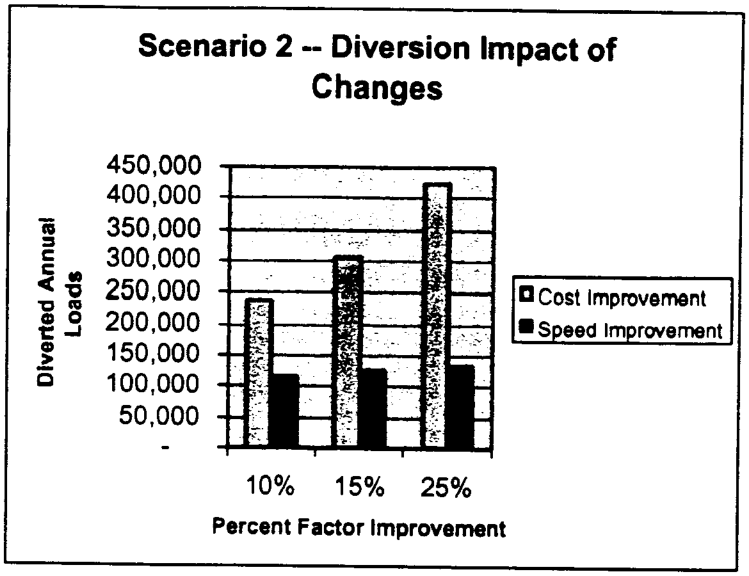


Figure 33

Scenario 3	10% Cost Reduction	15% Cost Reduction	25% Cost Reduction	10% Speed Improvement	15% Speed Improvement	25% Speed Improvement	25% Cost. 10% Speed Improvement
Cost Adjustment	10%	15%	25%	0%	0%	0%	25%
Service Adjustment	0%	0%	0%	10%	15%	25%	10%
Annual Loads Diverted	68,584	88,142	119,532	29,408	30,149	30,819	131,742
Percent of Daily HWY Loads	4.3%	5.5%	7.4%	1.8%	1.9%	1.9%	8.2%
Daily Diverted Loads	228.6	293.8	398.4	98.0	100.5	102.7	439.1
Diverted I-81 VMT (Millions)	6.7	8.9	11.8	2.2	2.2	2.3	13.4
Diverted I-95 VMT (Millions)	5.6	7.0	9.6	2.7	2.8	2.8	10.3
Diverted I-64 VMT (Millions)	0.8	1.1	1.5	0.3	0.3	0.3	1.7
Diverted I-77 VMT (Millions)	0.8	1.0	1.4	0.3	0.3	0.3	1.6
Diverted TOTAL VMT (Millions)	13.8	18.0	24.2	5.4	5.6	5.7	26.9

Figure 34

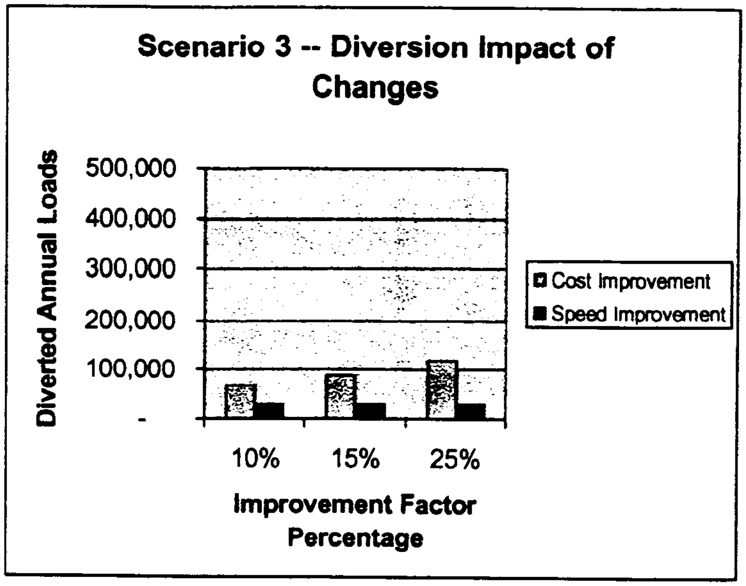


Figure 35

5.5 Discussion of Results

A review of the preliminary diversion estimates reveals a number of interesting facts. First, it is apparent that there are limits to the diversion potential that can be obtained from train speed improvement. This circumstance is constructed as a part of the diversion model, which indexes service against single-driver truck transits. Once parity with single driver truck-transits is achieved, maximum diversion potential is created. While there is the potential to divert additional traffic from team-driven freight, such potential is limited relative to the traffic volumes available from single driver movements.

A second fact is that cost reductions are not bounded in their ability to attract additional traffic. This too is a logical marketplace reality, and a principle of macroeconomic theory: as the cost of the rail intermodal service approaches zero, so will the use (up to the point of marginal indifference). For Virginia and this corridor, the implication is that subsidy – in whatever form – can be utilized to meter diversion volumes as infrastructure needs dictate, and commercial realities require.

A third fact to note is that mid-markets – such as Charlotte and Washington, DC represent significant diversion potential for Virginia. Whereas traditional intermodal economics cannot make such short-haul lanes attractive, there is sufficient density in these intermediate markets that the introduction of competitive intermodal services could offer the promise of significant highway to rail diversion.

Finally, the combination of service improvement and rate reduction provides a significant incentive to divert traffic to intermodal. Indeed, the model logic reflects the findings of the shipper and carrier surveys; that current intermodal services are not fast enough or inexpensive enough to warrant significant diversion.

The volume potential outlined in these preliminary diversion results suggest that Virginia could be well served to complete the additional analytic tasks outlined in the original proposal.

5.6 Opportunities for Modal Diversion

As would be expected, those lanes with significant intermodal activity already are most sympathetic to operating cost adjustments and service improvements. Lanes such as Atlanta-New York, Miami-Northern New Jersey, Jacksonville-Washington, and Memphis-Harrisburg that currently attract intermodal traffic divert additional volumes in this analysis. In many of the remaining lanes, current intermodal market share is zero. Issues of equipment compatibility, rail route circuity, lane density increase competitive rail costs and make diversion difficult.

Having identified the traffic lanes that provided the greatest opportunity for highway to rail intermodal diversion and a corresponding reduction in Virginia VMTs, we sought to examine in some detail the factors that currently limit additional market penetration in high-volume corridors.

5.6.1 ***Atlanta-New York***

In the Atlanta-New York corridor pair, two rail carriers are presently competing for highway traffic. Both CSX Transportation and Norfolk Southern Corporation have high capacity and high-speed routes available to move intermodal traffic between the two point pairs. Both carriers are marketing the service aggressively and the current market share of rail intermodal suggests that the rail carriers have been quite successful.

At the end points of the service corridor, however, both carriers are capacity constrained for terminal space. Both NS and CSX maintain multiple terminals in both Atlanta and the New York region and are thus denied the efficiency of and economy of large intermodal terminals. In addition, the high cost and limited availability of real estate in these markets further limits the carriers' ability to expand service to the corridor.

The multiple origins and destinations in Atlanta and New York also frustrate the carriers' ability to provide multiple train departures from the end point terminals. The lack of multiple departures reduces the competitiveness of the rail intermodal service in the corridor vis-à-vis motor carriers.

Thus for Virginia's I-81 Corridor, the ability to divert highway traffic to rail intermodal is inexorably linked to the capacity and efficiency of rail intermodal terminals in New York and Atlanta.

5.6.2 ***Miami –Northern New Jersey***

Although terminal capacity constraints in Northern New Jersey have impacted the penetration of rail intermodal in North-South corridors, other factors have also reduced the competitiveness of rail intermodal in this corridor. In the New York Market, there is a dearth of backhaul traffic as New York's commercial base is almost exclusively consumer driven. Carriers have responded by developing markets for backhaul trash, scrap paper, dredging waste, but the obvious lack of southbound traffic means that intermodal drayage operators are required to reposition equipment many miles to obtain a backhaul load. It is not at all uncommon for inbound loads to New York to return to the rails at Bethlehem and Harrisburg, PA for subsequent movement west or south. As rail carriers must reposition intermodal flatcars west for reloading, railroads limit through pricing the degree of market penetration in one-way markets to reduce empty repositioning of intermodal flatcars through pricing actions.

5.6.3 *Jacksonville—Washington, DC*

The Jacksonville—Washington, DC/Baltimore corridor is also served by two carriers and represents a competitive market. Like Philadelphia, and New York it is primarily a headhaul (northbound) market and railroads and motor carriers alike compete aggressively for the available backhaul (southbound) traffic. However, neither carrier has double stack clearances into the Baltimore/Washington market, and the less-favorable economics of TOFC service have limited the penetration of rail intermodal in the domestic dry-van containerizable traffic market.

5.6.4 *Memphis – Harrisburg, PA*

The Memphis —Harrisburg market is served only by Norfolk Southern. The most direct corridor – NS Shenandoah Route offers a low-speed and low-capacity connection between these two significant markets. Presently, NS operates between these two markets over the faster and higher capacity Piedmont Route. Both Memphis and Harrisburg provide expansive and efficient terminals (NS has recently expanded Harrisburg terminal capacity). Both NS routes are cleared for double stack operation and thus the carrier is able to offer competitive rates and service to this burgeoning corridor market. Highway access to and from Harrisburg from all the major East Coast markets is excellent, while Memphis serves as a gateway to Western rail carriers and the southwest United States.

6 Investment Alternatives for Virginia

There are two broad considerations in presenting railroad investment alternatives for the Commonwealth. The first is what kind of rail product is to be supported, because it will attract truck traffic from the highways and offer a real substitute for road construction. The second is what kind of strategy and rationale can be advanced, to further the underwriting of the rail product by the public.

6.1 Rail Product

The railroad product design that best reflects the findings and opportunities identified in this study uses a mix of conventional and unconventional intermodal technology in order to address a wide range of untapped market segments. It stresses speed, frequency, and reliability so as to offer a product that is fully the equivalent of single driver, over-the-road service, and not an inferior good. Its central focus is an appeal to a motor carrier clientele, because of the belief that market penetration may be achieved more rapidly by this route, and because the door-to-door integrity of the product may be stronger and therefore satisfy shippers more fully.

The product features trailer service, particularly through use of Expressway-style technology, due to the versatility of that equipment, and its ability to accommodate trailers just as they are on the highway. This is a very substantial point, since it removes a capital investment requirement for truck lines to move their own equipment by rail, allows their fleets to remain uniform and retain the efficiency of interchangeability, and reduces (but does not eradicate) the costly problem of trailer imbalance. The rapidity and low cost of terminal transfers in Expressway-style service also make the product effective for the high volume, shorter haul traffic, whose capture would raise the effectiveness of railway alternatives to road investments.

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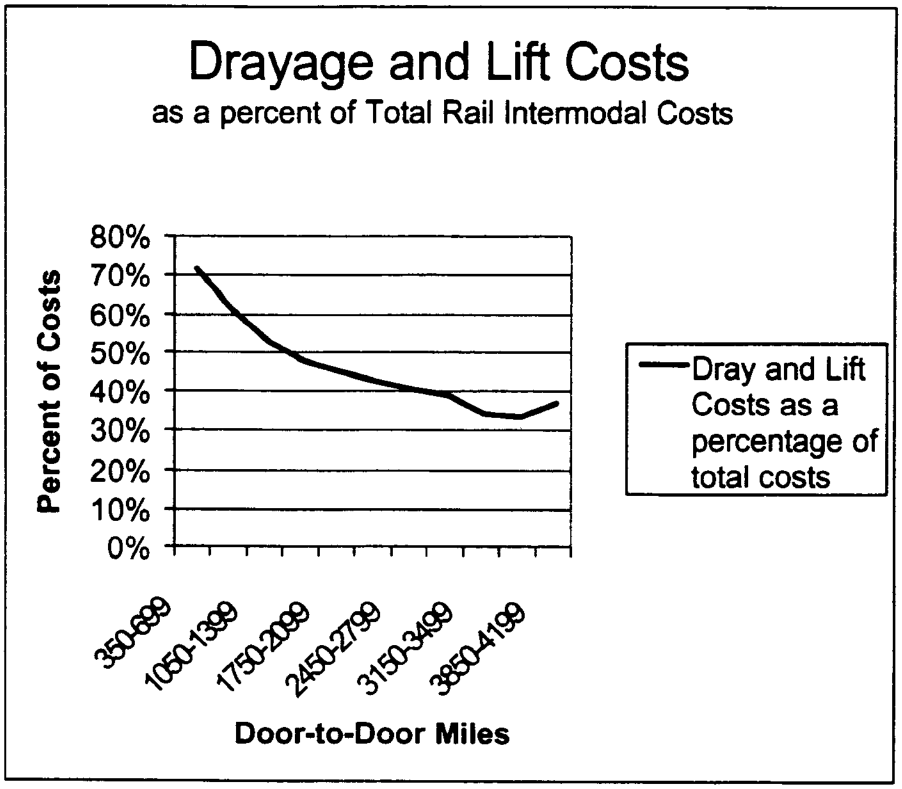


Figure 36

Through its use of frequent trailer service to single driver standards, the product is targeted especially to large network motor carriers. These carriers can provide superior pickup and delivery service, due to the presence of operating assets in virtually all important market areas, and their high degree of control over them. For those with irregular route structures, the ability to balance equipment without return trips drives down drayage costs. The combined factors of terminal lift and dray expenses approach three quarters of the total cost of intermodal operation at shorter distances, making the combined influence of Expressway-style service for network carriers a tactical solution toward a cost-effective product.

Finally, the introduction of highway competitive north/south rail service adds a critical link to the national intermodal system. Once large motor carriers can duplicate on the intermodal network the fleet balance economy they achieve on the highway, their use of rail is apt to rise and their cost competitiveness climb. This has a second order influence on road diversions, because the large network truck line with a low cost structure will win business away from less efficient operators, or cause them to convert to intermodal. While Expressway-style rail equipment is not apt to move freely in the intermodal system, the flexible service it provides for truck equipment is wholly effective at establishing the north/south link for the motor carrier networks.

6.2 *Public Options*

Three central issues govern the public options for underwriting the rail product:

- System dynamics, and the related matter of public jurisdiction;
- Railroad resource priorities; and,
- Public investment venues, and the question of operating subsidy.

6.2.1 ***System Dynamics***

Railroad and motor carriage networks are parallel, interdependent and overlapping operating systems designed to respond efficiently to freight market needs. The rail system is smaller and less flexible than the network available for motor carriage, and it suffers from balkanized right-of-way at the east/west territorial border. Truck lines that engage with rail use it for a subset of their business, and manage their fleet utilization and service performance across multiple modes.

The streams of highway volume between individual city pairs come together over portions of the interstate system and can create traffic densities for sustained sections that are conducive to rail transportation, whose unit of production is the train. Interstate 81 through Virginia is one such section. Intermodal terminals situated to serve this confluent volume can appeal not only to their local markets, but also to the through truck traffic, provided:

- They are located directly on the route of travel for the truck, and can be reached without penalty of circuitous miles;
- Service frequency is sufficient such that the truck is not materially delayed awaiting the next train departure; and,
- Through transit times across track and terminals – and thereby through service and utilization - are comparable to over-the-road travel, and the total cost of operation is superior.

Long drays to and from terminals like Knoxville and Rutherford are one way to serve confluent volume, and in addition may offer a solution to the balkanized deficiencies of interline rail service.

The markets these networks serve do not observe state boundaries, nor can the carriers who operate them. The performance and supporting investment necessary to divert traffic from roads to rail require action inside and outside of Virginia. Similarly, the investment benefits – and the penalties for lack of investment – fall broadly across the landscape. The pooled effort of the Commonwealth and the State of Tennessee in undertaking this study is a joint response to regional needs. In keeping with the nature of this study, it is appropriate to assert that the continued promotion of multi-jurisdictional action is a market-driven solution to the problems on the corridor. Seven or more states

(Virginia, North Carolina, Tennessee, Pennsylvania, New York, New Jersey and Maryland) ultimately should be involved in the effort to relieve congestion and improve safety along Interstate 81. Such coordinated effort is difficult, but it appears to serve the common, public interest.

But what options are available to Virginia – within its defined jurisdictional boundaries – that can mitigate conditions along I-81? At least three courses of action could provide relief by encouraging modal shift. These are: (1) direct investment on in-state intermodal routes, to support incremental growth in the high impact markets; (2) terminal investment in Virginia to target second-tier intermodal corridors such as Alexandria-Charlotte; and (3) changes to tax, tolling, or truck configuration policy on Virginia highways. Each of these alternatives should be analyzed in more detail and corresponding diversion-analysis conducted to evaluate the cost-benefit consequences for the Commonwealth.

6.2.1.1 Public-Private Cooperation

The public-private partnership initiatives observed in this study suggested that opportunism was a key factor in bringing the diverse interests of government and industry together. As the Commonwealth desires to help facilitate such partnerships, there is a clear need to locate demand for infrastructure investment. And indeed, the group has already begun to solicit initiatives from communities, transportation providers, and shippers. These efforts should be expanded so as to develop a portfolio of actionable projects. As legislative timing and private sector demand are unlikely to move in lock step, this project assortment becomes the basis for an opportunistic thrust.

Virginia should continue to meet with intermodal marketing executives from the various railroads, and seek to open up communication with parcel and motor carrier interests as well. To promote the exchange of ideas between shippers and carriers, the Commonwealth should lead formation of regional Intermodal Freight Council to serve as a forum for the exchange of ideas and information. Such a council should consist of shipper, carrier and government representatives. The attraction of such an organization for shippers and carriers is access to public funding and public sector decision-makers. It needs therefore to obtain the participation of appropriate public sector officials, and to seek access to funding at the federal and state levels for demonstration projects. Without access to public sector financial resources and the decision-makers that allocate those resources, carriers and shippers will quickly lose interest. Early meetings should focus on providing a forum for open dialogue between the public and private sectors, and developing investment priorities for the region.

The council structure and the continued dialogue between Virginia and the region's shipping and transportation industries should provide a sufficient array of potential projects. From this assortment, the most promising projects can be culled based on feasibility and net economic benefit.

6.2.2 Railroad Resource Priorities

Resource constraint is a major driver of railroad decision-making. Limited availability of capital is the primary of these constraints, but others include capacity ceilings on track, terminals, and operating assets. Within these constraints, railroads rationally seek to pursue projects that yield the best return, and to change the mix of traffic they carry so as to trade up to better paying business. Profitable freight may be dropped, and profitable opportunities not pursued simply because they are a less attractive use for scarce resources. Examples of the force of such restrictions have been encountered in the course of this study, including:

- The withdrawal by CSX of a second set of north/south trains, to free terminal capacity for higher margin east/west business; and,

- The disinterest in short-haul opportunities exhibited by some executives at Norfolk Southern, simply because there are conventional long-haul opportunities they have yet to exploit.

The difficulty with this system of resource allocation is that it may not suit public priorities, and public benefits normally are not a determinant in project and business selection. The crucial opening for the Commonwealth through which it can change this calculus is the diminishing access to private capital possessed by the railroads, and the ways that the introduction of public capital can alter the comparative evaluation of investments.

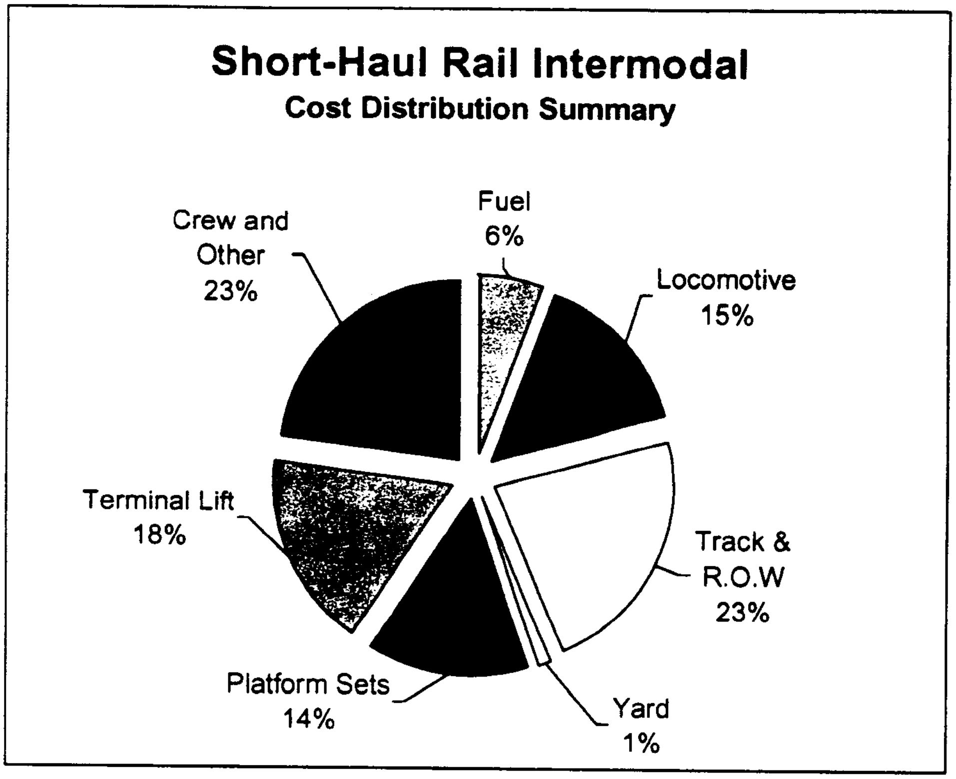


Figure 37

The cost constituents of intermodal operation for lanes examined in this study are displayed in the accompanying Figure 37; they cover all relevant expenses except drayage – which typically is not borne by the railroad. These are long term variable costs, meaning there is a significant short to medium term capital component in many of the elements. Track and right-of-way expense is the single largest factor, suggesting that public investment in rail lines on routes like the Piedmont or Shenandoah not only could lead to faster, more attractive service, it could make new I-81 corridor operations more competitive with project alternatives inside Norfolk Southern. The same argument could be extended to other cost constituents; to infrastructure in the form of terminal investment, and even to rolling stock in the form of platform sets and locomotives.

Public capital employed this way serves two functions: it (1) facilitates cost reductions that should make intermodal products attractive and even compelling to the market, and (2) changes the internal priorities of the railroad. A third function is set off by the effect of public investment on cost of capital. It is well documented that Class I railroads, despite registering impressive productivity gains in recent decades, still fail to earn their cost of capital. This fact contributes strongly to the flight of private investment away from the industry. The substitution of public financing – whose "investors" valuation philosophy can be quite different from that of the private sector – can reduce this expense and narrow the gap between railroad return on investment and the cost of funds. One potential consequence is a kind of virtuous cycle, in which more private financing becomes available to railroads because capital costs are now being recovered.

6.2.3 ***Public Investment Venues***

The key dynamic in the traffic diversion analysis conducted for this study is public investment that allows the introduction of new intermodal trains, raises their performance characteristics, and reduces their cost of operation. Funding of infrastructure improvements is the chief form of investment under consideration, particularly through the upgrading of right-of-way, and also through the expansion or new development of terminals. The broad outline and potential from improvements have been laid out in the development and testing of the scenarios. Specific project elements that may deserve investment, and their ultimate performance effect and influence on diversion, will be evaluated in the next stage of study.

As a more or less direct substitute for highway infrastructure spending, the track structure and terminal venues may have the most political appeal. However, there is an important argument to be made for an operating subsidy over a limited term, and a capital-based method of producing one. In addition, several other steps may be available to support traffic capture by intermodal services.

6.2.3.1 *Operating Subsidy*

The notion of subsidizing rail operations seems redolent of inefficiency and waste, but linked to an expiration date for a particular marketing purpose, the notion holds promise. A common difficulty in the introduction of new freight transportation services is the development of adequate baseload. This is encountered in LTL trucking, in air freight and elsewhere when fixed schedules are called for, as well as in railroading: a new train start (or line haul truck, or airplane) is brought on line to meet known market needs. The operation performs as advertised, but it does not capture sufficient volumes to fully utilize the assets. The operation is left in place, but after a time the schedule is compromised by holding it for more volume, or running it only a few times a week. Its market appeal drops, and the service withers.

It is normal for customers to be slow to change carriers and adopt new services. This can be an effect of contract commitments, business award cycles, loyalty, risk aversion, or simply the need to wait for an incumbent to stumble. The objective of a market-based operating subsidy is to sustain new services at full performance specifications, long enough for their baseload to mature. In our experience, this period is eighteen months or more, and not the three to six months typically allowed. The mechanism by which subsidy could be proffered is through investment in rolling stock for a fixed period of time. For the Expressway-style product that is one of the corridor options, funding for the relatively expensive platform sets is an obvious choice, and may be necessary to make the service viable. Locomotive financing is another possibility, and could fully or partially cover a very expensive piece of capital equipment.

6.2.3.2 Other Steps

Norfolk Southern views its intermodal terminal capacity as fixed, largely because of the extreme difficulty and long duration of public approval processes. Recognition that rail terminals are precursors to intermodal service and highway relief, and development of substantially expedited processes should be in the public interest. Preparation of such a process is a role the VDRPT might undertake, in conjunction with the Virginia DOT, local agencies, and especially with officials in neighboring states, whose facilities would funnel traffic through the Commonwealth.

Drayage is a major cost component in intermodal services, especially at shorter lengths of haul. Public allowances that support drayage service and reduce its cost would aid the viability and penetration of rail. Rebates of the fuel taxes or tolls paid by these trucks are two of the possibilities – and here again, cooperative agreements between Virginia and its neighboring states would be sensible, because drayage normally ties to an interstate rail shipment.

Tolls or other taxes imposed on trucks are another way to shift the competitive balance. An option that is even more controversial is to introduce truck bans along the routes that carry heavy truck volumes. For example, New Jersey has instituted bans along Routes 31 and 29, prohibiting trucks equaling or exceeding 26,000 lbs. Fine and point systems are used to enforce the law, and the result of their widespread implementation has been over a 10% reduction in the number of trucks along the routes. Whether these may be appropriate policy responses or not, two clear drawbacks are that they create suspicion and hostility towards railroads by their prospective clientele, and make freight transportation more expensive without necessarily making it more productive.

6.2.4 Implementation

The railroad investments contemplated by the Commonwealth in connection with this study may be large scale. An alternate or supplemental approach would be formulation of a series of smaller projects, each aimed toward a consistent set of strategic and cumulative objectives, but each more or less justifiable on its own. There is a risk with new services that they will not capture traffic, and while one purpose of a market study is to reduce this risk, its downside is greater with a greater investment. Furthermore, some of the reluctance on the part of both public and private sector agencies with respect to public-private partnerships can be tied to a skepticism about common interests and benefits. The shipper survey results reflect the historical role of government in transportation infrastructure as a highway provider, and suggest that support for public investment in multi-modal infrastructure remains tepid. Similarly, the State's budgeted investment in non-highway infrastructure suggests that legislators may be similarly unconvinced. Demonstration projects in Virginia could help solidify support for public-private partnership programs, and perhaps help Virginia add to the array of skills and experience that will make larger projects more likely to prosper.

The successful completion of one or more demonstration projects serves three purposes. First, it may establish Virginia as a facilitator of public-private partnership initiatives and strengthen essential skills for additional projects. Second, these small projects could demonstrate the value to both the public and private sector of partnership initiatives, and prepare the structure of communication, organization, and financing that will pave the way for future proposals. Third, if the projects are designed with a common end in mind, they will build toward a larger result with less incremental risk. A deficiency in this approach may be that the scale of any investment is never dramatic enough to change the character of services, and shift the market toward rail.

6.3 Conclusions

Structuring a reasonable balance between public and private costs and public and private benefits for intermodal projects is clearly a work in progress. The results of this study suggest that such projects – regardless of scale – require a significant level of commitment, resourcefulness, and creativity. Nevertheless, the market volumes are more than enough to interest rail operators, and aggressive levels of service and cost may capture enough traffic to constitute a real if partial alternative to highway construction. The network-level investments contemplated by the Commonwealth, and the cooperative effort with carriers and neighboring states that such proposals will lead to, could have national import. For railroads with limited capital and prospects for growth, for states with limited options for the provision of capacity, and for motor carriers seeking lower costs of effective operation, such investments begin to create a new level of possibility. The market certainly is big enough, and it is apt to reward performance.

Appendix 1 - The Intermodal Freight Visual Database

Building from TRANSEARCH, the national database of freight traffic flows that Reebie Associates created and has maintained and provided to the transportation industry for 18 years and drawing on its experience with custom database development, the team researched information needs and data sources in the government and commercial markets and the capabilities of state-of-the-art software. The results of the effort have been to make available a national county-to-county and zip code-to-zip code data product. Key user needs like currency of the data, its reliability, flexibility in terms of seeing details of the traffic composition or relatively broad data summaries, and affordability can be satisfied.

Issued annually, the data can cover all modes and commodities, including empty truck movements, international shipping, and truck shipments of non-manufactured goods. Features like external trip ends, vehicle miles traveled, gross ton-miles, and forecasts can be provided, and traffic routed along major modal corridors can be displayed.

The database maps commodity flows (2, 3 and 4 digit STCC) in short tons between geographic entities (states, counties, BEA's) by mode (rail car, rail intermodal, truck load, less than truck load, private truck, air and water) for current year and forecast years. All volumes shown in tons are in short tons, for 2000.

A variety of data sources are used to compile the database ranging from government agencies to private sector industry associations and the carriers themselves, as shown in Figure A-1.

The data sources vary by the different modes of transportation. The primary source for railroad data is the Carload Waybill Samples gathered from about 4% of total rail car traffic. Reebie Associates sources this data from the Surface Transportation Board. This data is compiled to provide both volumes and patterns of flow.

The primary source for waterborne commodity flows is the Waterborne Commerce Statistics compiled by the Army Corps of Engineers. This data tracks the flow of commodities along domestic lakes, rivers and canals, and is used to develop both volumes and patterns of flow.

INTERMODAL FREIGHT VISUAL DATABASE DATA SOURCES

Mode	Data Source	Agency/Organization
Rail	Carload Waybill Sample	Surface Transportation Board
Water	Waterborne Commerce Statistics	U.S. Army Corps of Engineers
Air	FAA Airport Originating Tonnages	Office of Airline Statistics (DOT Form 41)
	Airport to Airport Flows	BTS Office of Airline Information
	Commodity Flow Survey	Bureau of Transportation Statistics
	TRANSEARCH	Reebie Associates
Truck	Carrier Data Exchange Program	Reebie Associates
	TRANSEARCH	Reebie Associates
	Annual Survey of Manufactures	U.S. Census Bureau
	Freight Locater Data Service	Reebie Associates
	General Statistics for Verification	Industry Associations
	Commodity Flow Survey	Bureau of Transportation Statistics

Figure A-1

The air data is compiled from four major sources. The first is FAA (Federal Aviation Administration) airport originating tonnages primarily from Form 41 reports and compiled by the Office of Airline Statistics (Federal). This source establishes volume estimates at airports. The second source is airport-to-airport (ATA) flows compiled by the BTS Office of Airline information. These data are used to establish flow patterns. The third source is from Commodity Flow Survey (CFS) data, used to define the commodity types. The fourth source is Reebie Associates' TRANSEARCH Database, which supplements the CFS data.

The trucking data process is more complex and comes from a wide variety of sources developed over the course of 20 years. However, there are four primary sources. The first is a data exchange program Reebie has with motor carriers, which is used to estimate patterns and volumes. The second source is a variety of industry associations (timber, plastics, chemical, automotive, etc.), which provide overall volume information for the respective industry sectors. The third major source is from the Annual Survey of Manufactures, primary employment and output data by industry, distributed at the state and local level. This data maps production and consumption of commodities and is used to calibrate the trucking flows. The Freight Locater data service is a database of industrial facilities and their exact location. This data supplements the previously mentioned sources to help calibrate the flows of goods between specific geographic entities.

IFVDb Data Issues and Limitations – Reebie Associates recently developed a finer detailed version of its TRANSEARCH database in an FHWA sponsored project known as the Intermodal Freight Visual Database. It breaks down origin and destination market areas to the county level and is compatible with GIS applications. It has been incorporated into TRANSEARCH, with its most current base year as 2000. This database is the primary source for the Wilmington – Harrisburg Corridor Study.

For this study, TRANSEARCH data were identified at varying levels of detail. It is generally understood that large databases of this kind are never perfect, and TRANSEARCH is not an exception to the rule. It is, however, the best available source of its kind in the cognizance of the study team. TRANSEARCH is in use by virtually all major U.S. railroads and by more than a hundred motor carrier companies and several container shipping lines and air cargo carriers. State and federal planning agencies, as well as port authorities, equipment suppliers, investment banks and judicial and regulatory bodies also use it.

TRANSEARCH reports provide a broad picture of freight traffic movements in the United States. Various publicly available sources, as well as Reebie's proprietary motor carrier data exchange information, are used in the development of the TRANSEARCH database. Understanding the nature of particular sources when using TRANSEARCH data is important to interpret the information correctly. The following guidelines should be helpful in gaining that understanding.

1. Freight Rehandled By Truck From Warehouse and Distribution Centers Is Identified as STCC 5010 and Referred to as Secondary Traffic at a 4-digit STCC level or STCC 50 at a 2-digit STCC level. Many of these types of facilities handle a wide range of different types of commodities, and outbound shipments may also be of mixed consists. For example, shipments from a supermarket chain distribution center are likely to contain a broad range of packaged food products and other consumer items.

2. The Truck Portion of Truck/Rail Intermodal Activity Is Shown as STCC 5020 at a 4-digit STCC level or STCC 50 at a 2-digit STCC level. This activity includes two segments: the truck shipment, by trailer or container, from true origin to the intermodal railhead, and from the intermodal railhead to final destination. The Rail Intermodal mode reveals the origin and destination points on the rail system, not the ultimate origin and destination.

3. STCC 5030 Is Used to Identify the Truck Drayage of Air Freight Traffic 5020 at a 4-digit STCC level or STCC 50 at a 2-digit STCC level. Both the true origin to airport, and airport to final destination are included. Origins and destination for movements classified in the air mode are airports. Volumes that are transloaded from one aircraft to another are not shown at the transloading point.

4. Large Portions of Today's Intermodal (TOFC or COFC) Traffic Are Reported In Non-Commodity Categories. Commercial arrangements in the railroad industry have fostered the use of "third parties" such as consolidators and forwarders. Such traffic typically is labeled as "Freight Forwarder Traffic", "FAK" (Freight: All Kinds), or "Miscellaneous Mixed Shipments". The specific commodities moving under these arrangements are not identified in the public use data sources.

5. Shipments Made Up Of Several Commodities Will Be Credited To The Dominant Commodity. This occasionally occurs in the commodity identification of rail shipments. In

these instances, the tonnage attributed to the predominant commodity is greater than it should be, and the other commodities in the shipment are understated.

6. To Provide Maximum Product Identification, Commodities Are Shown At the Greatest Level of STCC Detail For Each Code. Truck data is available and shown at the 4-digit level for the manufacturing sector. Rail data, however, can be shown at 5-digits. Because of the desire to include the greatest amount of detail possible, commodities in a traffic lane may be identified at different levels of detail for each mode. When this occurs, tonnages shown at the more detailed levels should be combined with those displayed at the more aggregate levels to gain a complete picture of modal share for the commodity. All freight traffic flow information in the study is expressed at the 4-digit STCC commodity code level, or consolidated to a 2-digit, or no commodity detail level.

7. Tonnage Data In Each Cell Should Be Used As An Indicator Of Relative Value—since many of the sources for traffic flow information use sample data. Consequently, the more specific the definition of a particular flow, the greater its sampling variability. The more aggregated the definition of the Geography/Mode/ Commodity combination, the more reliable the results.

8. State-To-State Movements Of "Primary" Freight At The 2-Digit STCC (or SIC) Level Provide The Best Picture Of Primary Freight Moves In The Data Base. Analysts and planners, however, want and need more disaggregate pictures of the flow activity. Not all of the data used in TRANSEARCH comes into the process beneath the state level or with more than 2-digit commodity/industry classification.

    Where the data is available at a disaggregate level, it is used directly in the TRANSEARCH development. The remaining, more aggregate volumes undergo a rigorous process of disaggregation. Inherent to that process is the matter of proportionality. Origins of traffic are assigned on the basis of the location of employment and at destination in terms of the consumption of those commodities using the input/output table of the U.S. economy by industry and/or population. Typically, this process begins with the state-to-state flow patterns by commodity. The process implies that each portion of the state's freight in both the origination and destination of the traffic is proportional to its demographics and not specific to market conditions or business arrangements.

9. TRANSEARCH Traffic Flow Patterns Are Based On Domestic Business Activity And Population. In fact, portions of the traffic are influenced by export activity at transborder points and at both air and water ports. Assignment of international traffic to these "demand" or "consumption" points is difficult from the existing records. These records, therefore, are not explicitly identified as such in the standard TRANSEARCH processing.

Appendix 2 - CostLine

Carrier CostLine is a family of transportation costing software models used to calculate freight carrier shipping costs. The models are designed:

- to improve and speed rate negotiations by shippers;
- to provide cost analysis capabilities to carriers; and
- to allow for economic analysis of corridors, policies and investments by public sector users

Models are updated quarterly. Software is available for Windows and other operating platforms. It is self contained, with minimal data requirements, and provides Help screens and documentation to guide the user. Data to build the models comes from a variety of government, association, subscription and for-profit corporate sources. These include agencies such as Surface Transportation Board, US Department of Energy, US Department of Labor, US Department of Commerce and Statistics Canada in Canada.

The **Rail Cost Analysis Model (RCAM)** can supply shippers and carriers with an informed view of what it costs a particular carrier to transport shipments by rail. It is built on the Uniform Rail Costing System (URCS) platform and captures over 90 cost/service elements, which the user can accept as defaults or simply adjust. Information is carrier specific for both U.S. and Canadian railroads. An optional mileage module is available. Output reports provide both summary and detailed information on a shipment, including a detailed view of cost and rate components.

The **Truck Cost Model (TCAM)** analyzes shipment profitability for any equipment and distance, for truckload and LTL carriers in the U.S. and Canada. Market –specific empty mile estimates for dry van operations are in the system. Individual carrier information is available. Output reports display summary and detailed cost information on an individual shipment, with user inputs or default values.

Barge Cost Model (BCAM) covers operations on the inland waterway network. In a multi-year effort, Reebie Associates developed BCAM for the United States Army Corps of Engineers. The model combines detailed analysis of service and cost factors to guide the Corps in operating and development decisions affecting the barge industry. Reebie Associates also markets this model as a commercial product. Highly detailed: calculations are done by river system. There are over 350 ports. As with the other CostLine products, BCAM is simple to manipulate, and the user can cost shipments with the defaults provided, or enter specific values.

Appendix 3 - Rail Routing Model

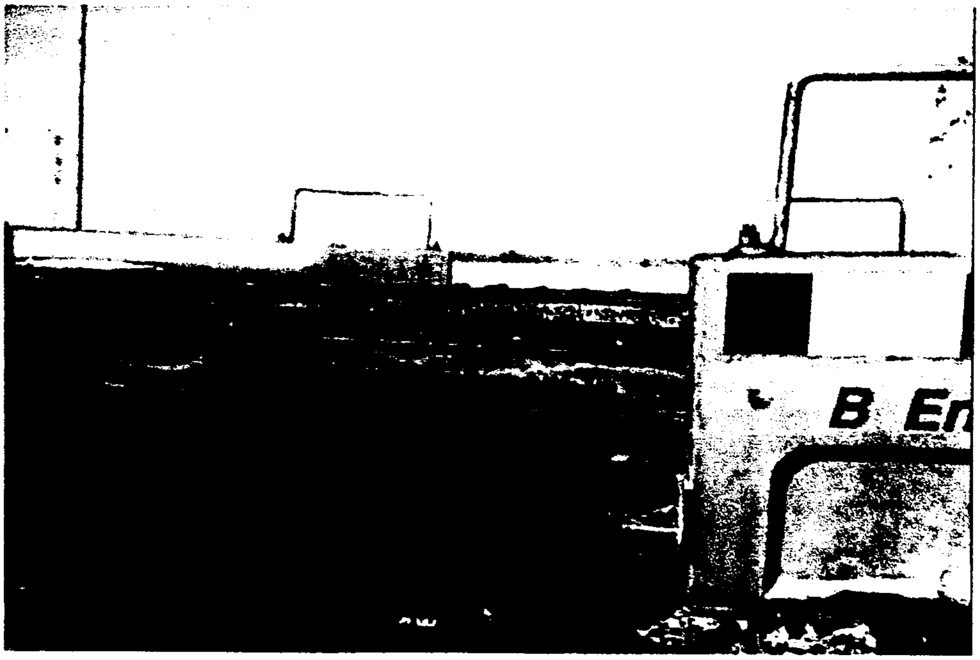
Reebie Associates used the DNS Routing model to estimate rail flows and mileages. This is a minimum impedance model using a continuously updated rail network, and routing favoring trunk lines. The routing is validated in studies ranging from merger applications to cost analysis.

Appendix 4 - Expressway Pictures

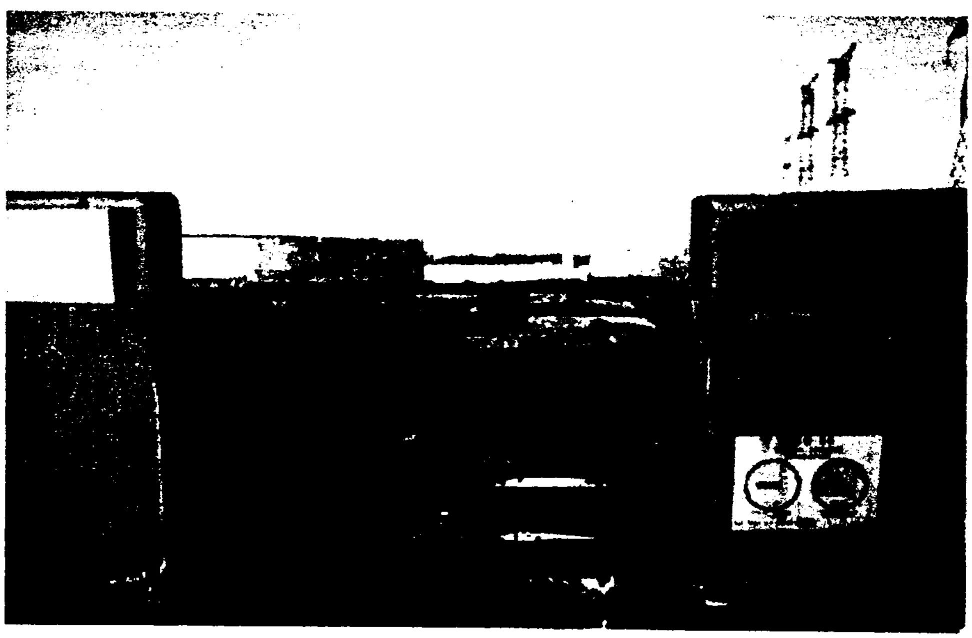
Selected Photographs of CP's Expressway Equipment Taken at Toronto West Terminal, January 23,2003

No. 1: Loaded track on the left with an empty track to be loaded on the right of the photograph.

No. 2: The trailer is being backed up the ramp onto the rail cars at the extreme right-hand corner of the photograph.



No. 3: This standard coupling between sets of cars had permanent platform plates and very little slack to prevent in-transit damage.



No. 4: This articulated truck connects two cars without couplers

No. 5: The stanchion is pulled up and knocked down by the yard tractor.

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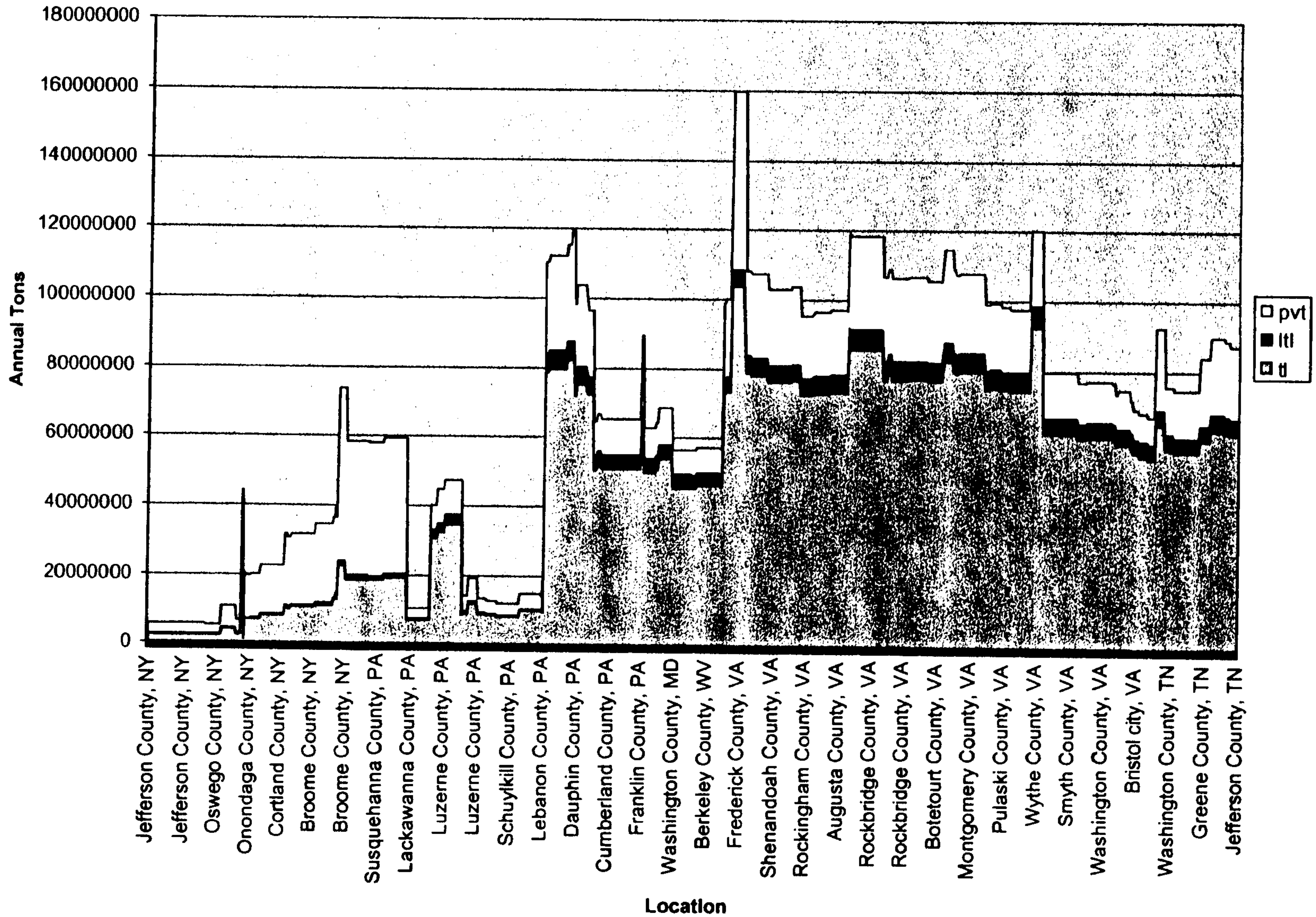
Appendix 5 - Traffic Distribution

The attached charts show the freight traffic on Interstate 81 from the Ontario border to the intersection with Interstate 40 in Tennessee, and Interstate 95 from Miami, Florida to the Boston, MA suburbs. They are based on TRANSEARCH data, flowed over the Oak Ridge Network. Type are truckload (tl), less-than-truckload (ltl) and private truck (pvt). Length of haul is divided into hauls under 100 miles (short_tons), hauls between 100 and 500 miles (medium_tons), and hauls over 500 miles (long_tons).

I-81 Tons by Type



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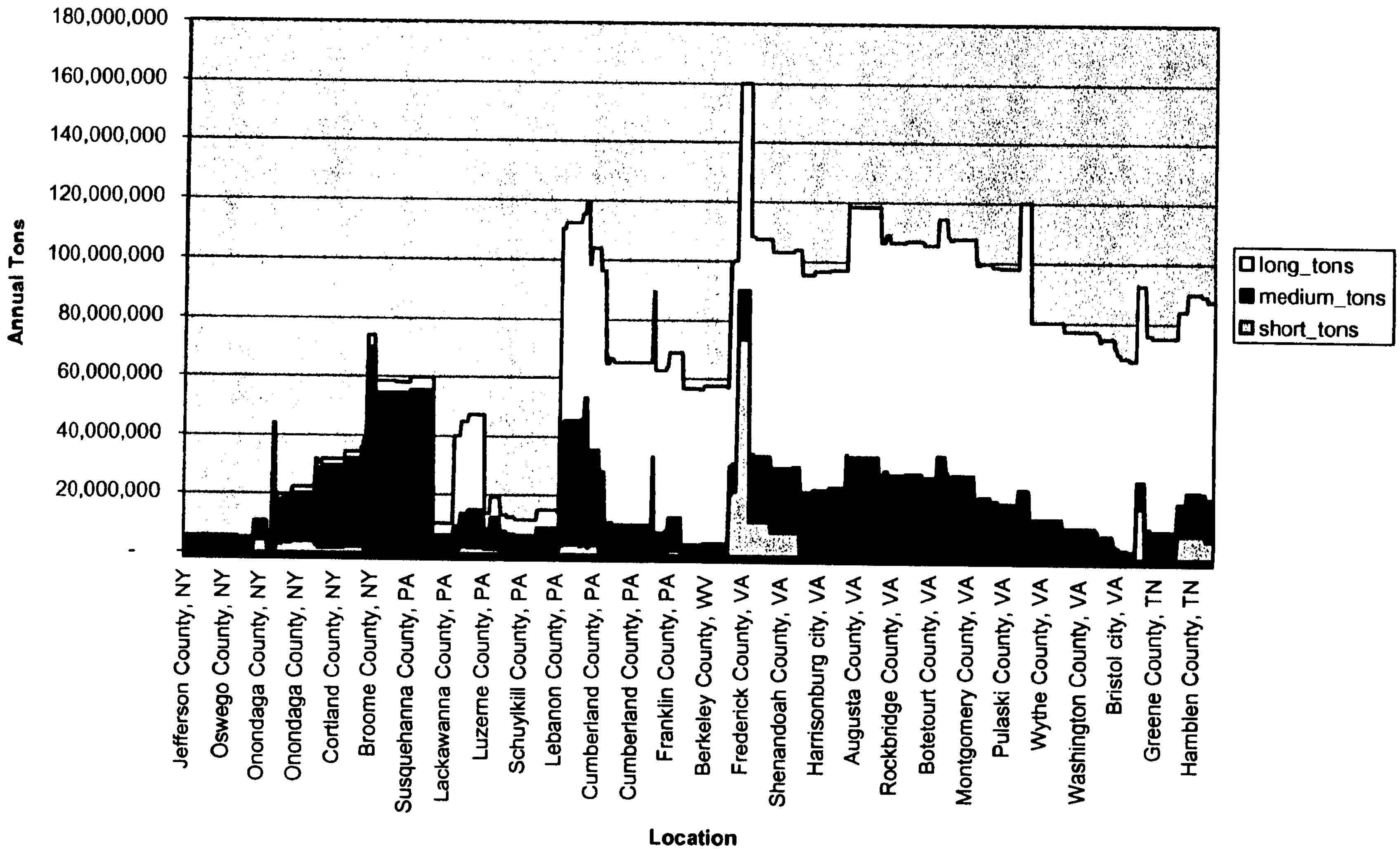
I-81 Tons by Length of Haul



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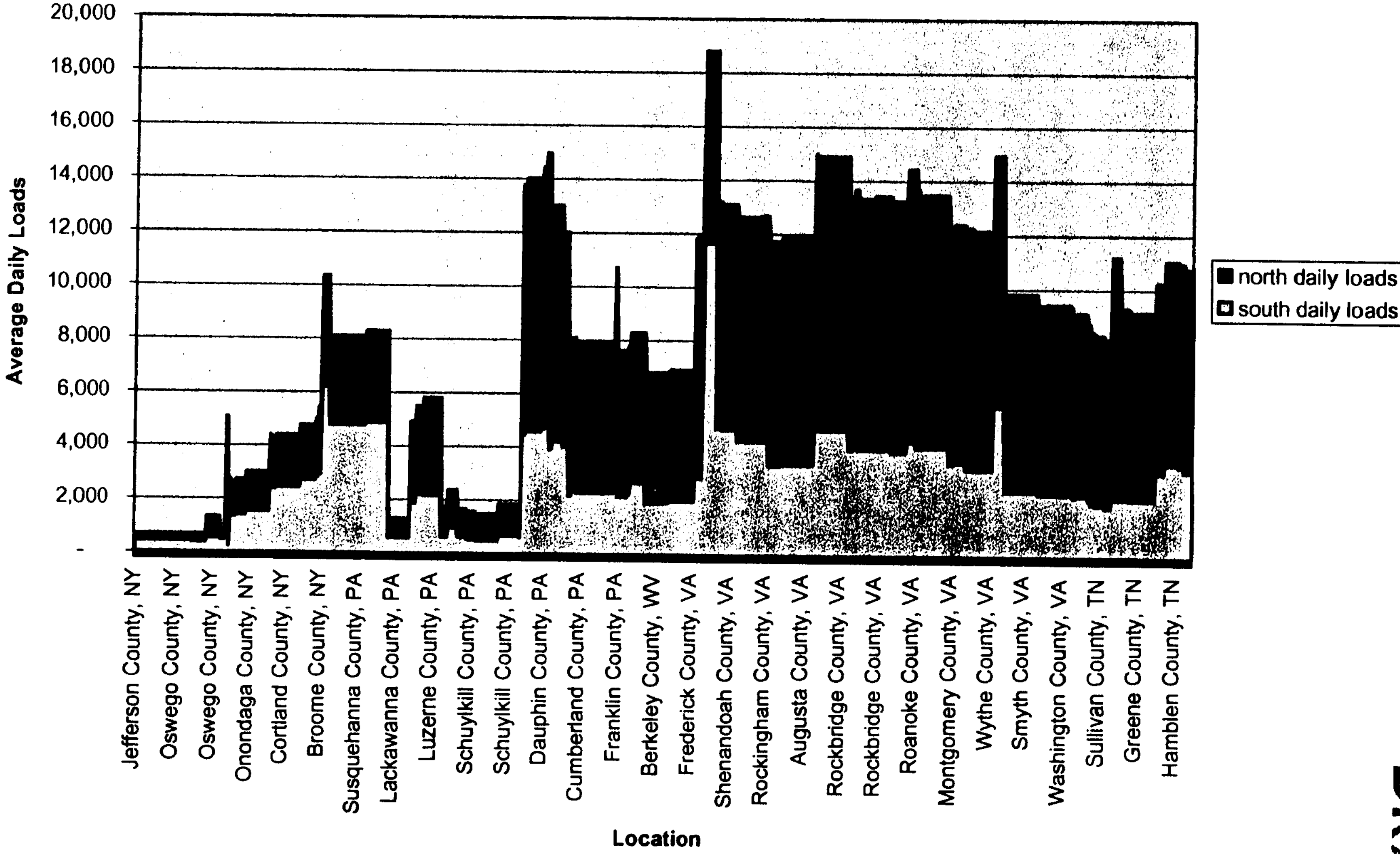
I-81 Loads by Direction



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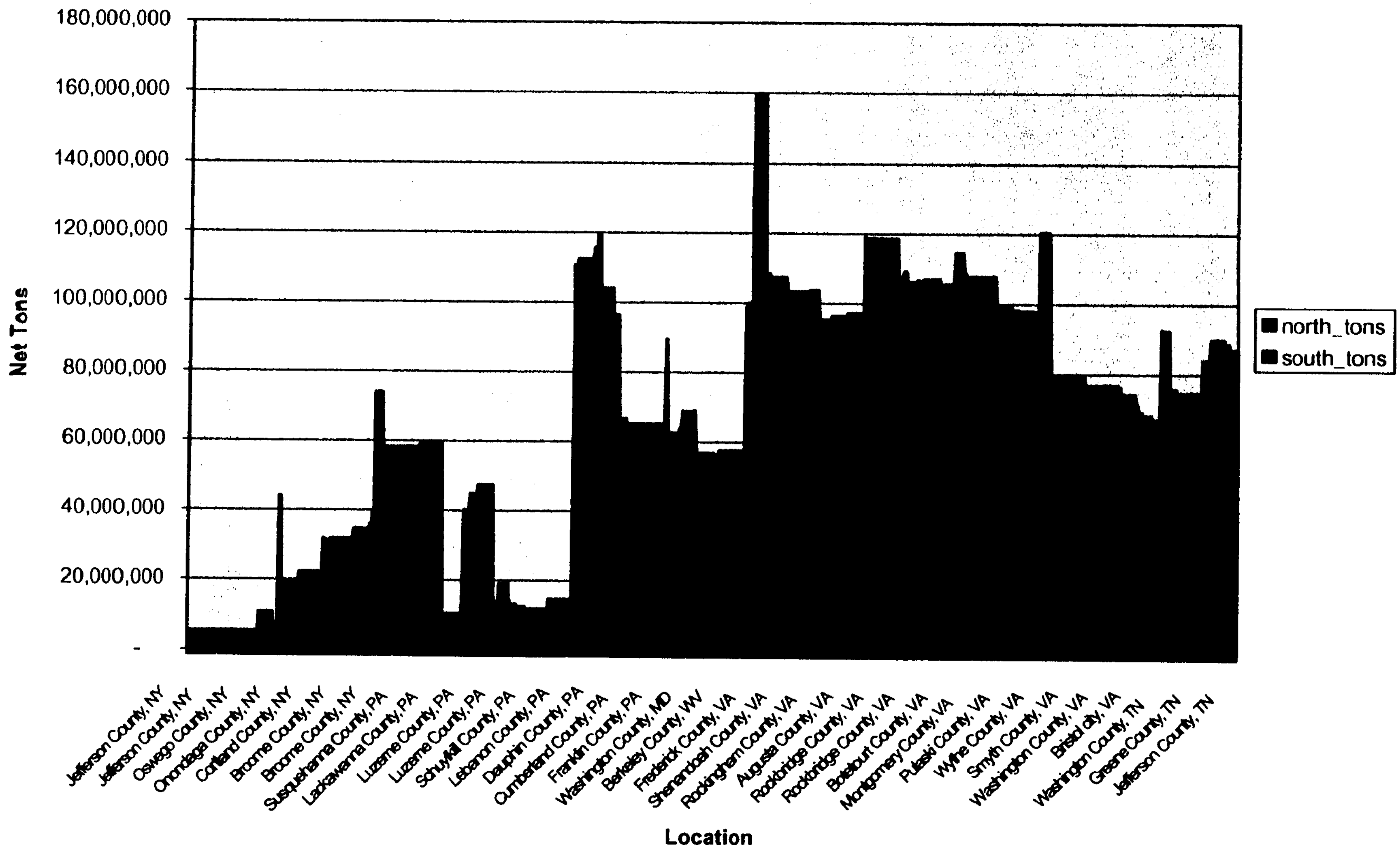
I-81 Tons by Direction



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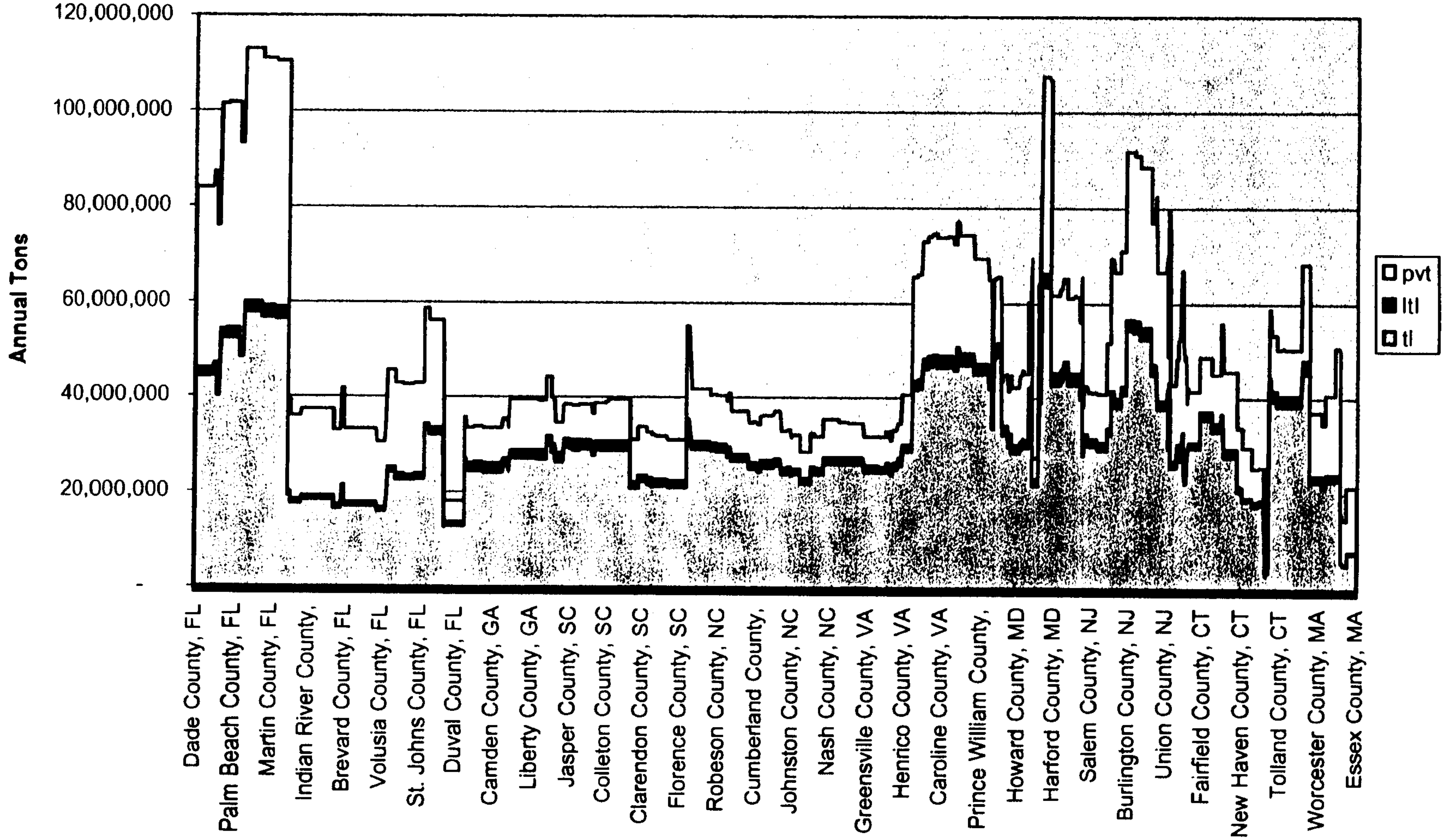
I-95 Tons by Type



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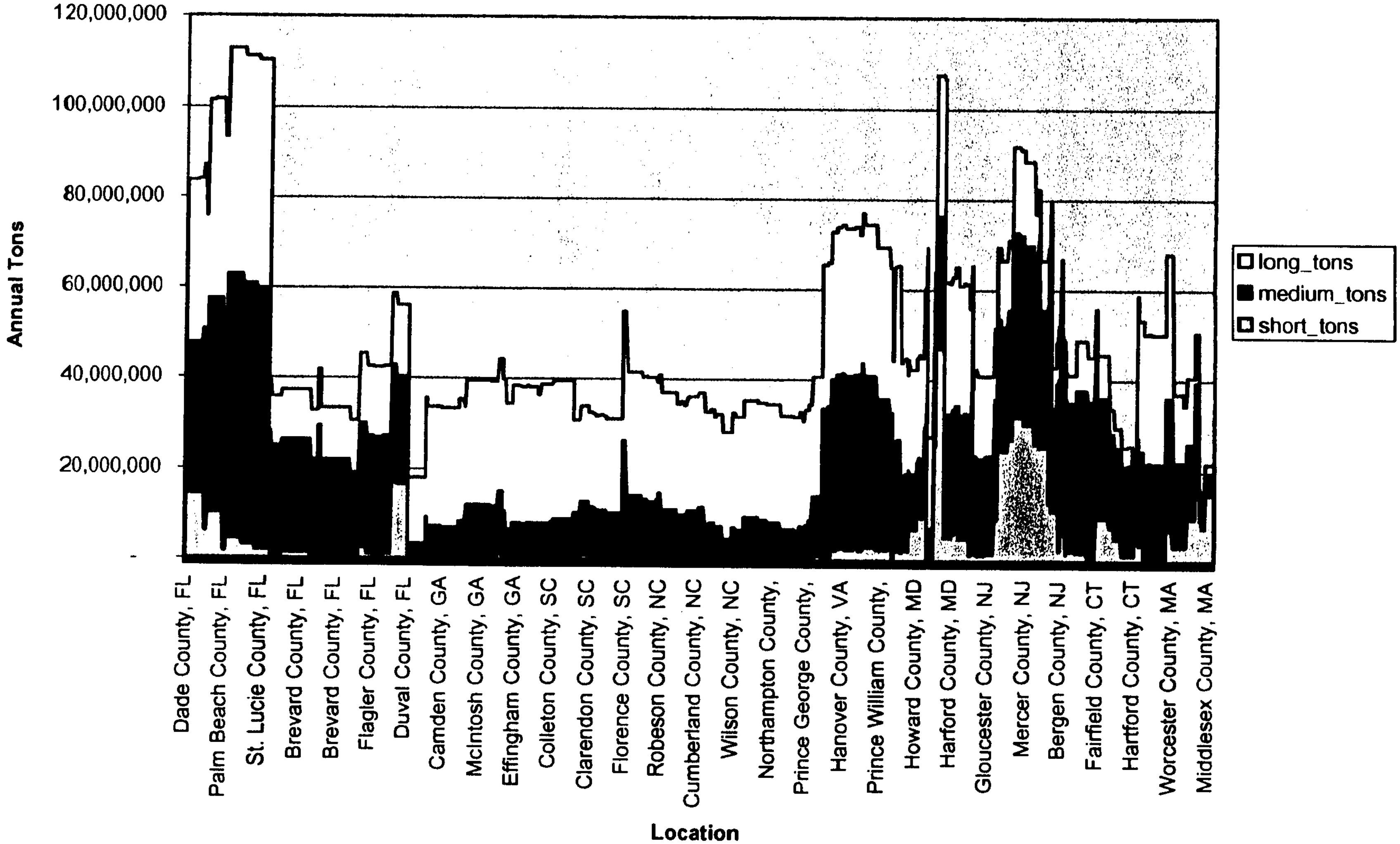
I-95 Tons by Length of Haul



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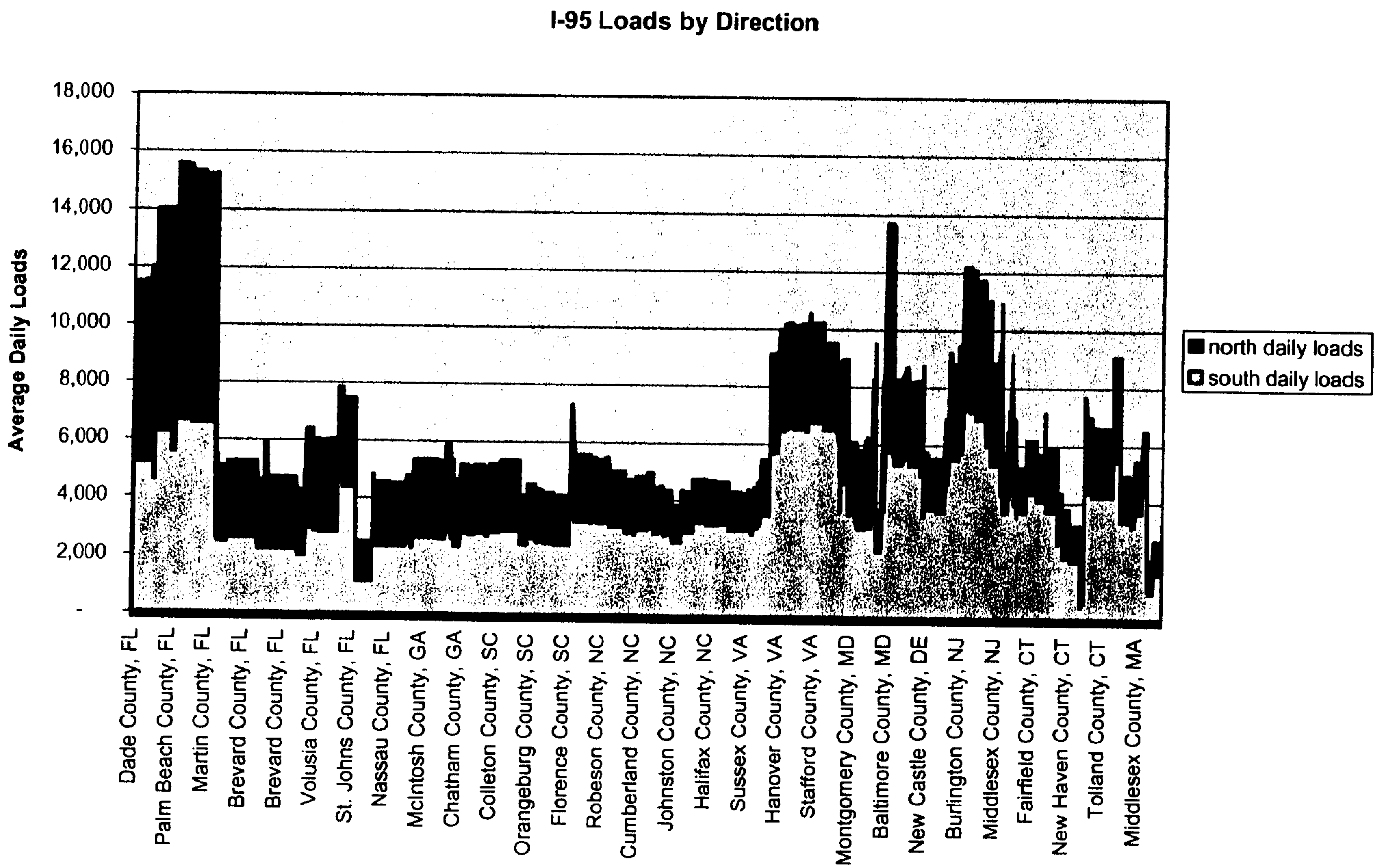

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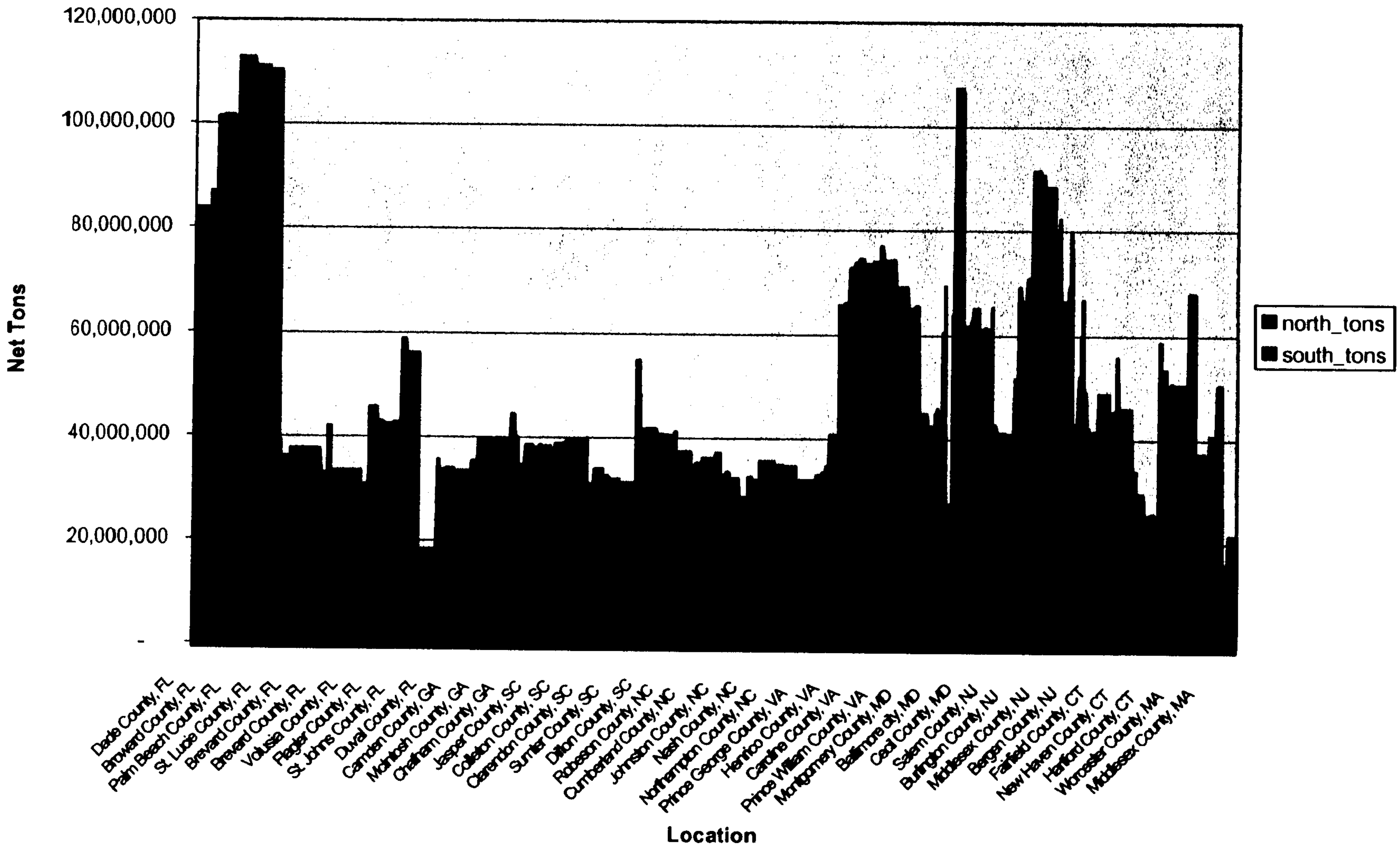
I-95 Tons by Direction



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Appendix 6 - Motor Carrier Survey

Attached is a sample of the survey sent to motor carriers. For a number of carriers, this was supplemented with oral interviews.

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REEBIE

February 13, 2003

«Sal» «Fname» «Lname»
«Title»
«Company»
«Address»
«City», «St» «Zip»

Dear «Sal» «Lname»:

Reebie Associates is currently engaged in a project with the Virginia Department of Rail and Public Transportation. This project is described in a letter from the Department's Assistant Director for Rail that is included in this package. Your company has been identified as a key player in the markets in question.

We would like to arrange to interview you personally regarding your survey response. Someone from the Reebie project team will be in contact with you in the near future about scheduling an interview. The results from this study will have a definite impact in improving a carrier's ability to move freight through Virginia and neighboring states.

We hope that you will find time to complete the survey and to talk with us about your operations in the area. We very much appreciate your time and attention.

Sincerely,

Joseph G. B. Bryan
Principal
Reebie Associates

JGB:csn

Enclosure

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Virginia I-81/I-95 Market Study

1. Approximately how many loads in total did you handle in the past year? What was the average length of haul?	Truck Intermodal Truck Intermodal
2. Is there a length of haul defined below which intermodal service is not practical for your operation? If yes, what is that length of haul?	Yes No
3. How much circuity can your intermodal shipments support as a percent of the total length of haul?	
4. What is your average dray cost per mile?	
5. How many loads originated in Virginia? How many loads terminated in Virginia?	Truck Intermodal Truck Intermodal
6. What number of loads moved from the southern states to the northeast? What number of loads moved from the northeast to the southern states? South: FL, GA, AL, NC, and SC Northeast: Eastern PA and NY, NJ and above	Truck Intermodal Truck Intermodal

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Virginia I-81/I-95 Market Study

7. (a) How many loads moved to the northeast from TX, LA, AR, MS? Northeast: Eastern PA and NY, NJ and above	Truck ☐ Intermodal ☐
7. (b) How many loads returned to TX, LA, AR, MS from the northeast? Northeast: Eastern PA and NY, NJ and above	Truck ☐ Intermodal ☐

8. For intermodal shipments along the east coast, which ramps are used frequently often? Check all that apply.

- ☐ Jacksonville
- ☐ Savannah
- ☐ Atlanta Hulsey Yd
- ☐ New Orleans Gentilly
- ☐ Charlotte
- ☐ Charleston
- ☐ Nashville Radnor Yd
- ☐ Memphis
- ☐ Memphis Leewood Yd
- ☐ Portsmouth
- ☐ Greenville
- ☐ Alexandria

9. What impediments do you find when using intermodal service between the south, the southeast and the northeast? Check all that apply.	Length of Haul Ramp Access Ramp Congestion Access to Dray Resources Pricing Transit Time Service Reliability Other, Please Specify:

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Virginia I-81/I-95 Market Study

10. What impediments do you find when using intermodal service between Texas and the northeast? Check all that apply.	Length of Haul Ramp Access Ramp Congestion Access to Dray Resources Pricing Transit Time Service Reliability Other, Please Specify:
11. Do you have specific feedback regarding the highways in Virginia, particularly I-81 and I-95?	
12. Can you quantify the number of miles traveled on these two highways in the past year? If you cannot quantify the miles, which do you believe is used more heavily in your operation?	I-81 ____ I-95 ____ I-81 I-95
13. Are your trucks traveling frequently on US 29?	Yes No Don't Know

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Virginia I-81/I-95 Market Study

14. Are you familiar with RoadRailer® technology?	Yes No
Would you make use of RoadRailer® equipment if it were made available to you? Comments:	Yes No
16. Are you familiar with the concept of the Iron Highway, Rolling Highway or Expressway™? As it is used in Canada? As it is used in Europe?	Yes No Yes No Yes No
17. Do you believe that this concept might have application in the US, particularly along the east coast?	Yes No
18. If such a service were available and practical between certain points in the south, the southeast and the northeast, would you use it?	Yes No
19. Please describe those things that would be necessary for the service to be practical for your application.	

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Virginia I-81/I-95 Market Study

20. In evaluating a new intermodal product, what five things are most important to you?	
21. Do you have traffic in the 600-900 mile length of haul that could be moved via intermodal if a competitive product were offered?	Yes No
22. Would more frequent departures impact your intermodal decisions in the 600-900 mile length of haul category?	Yes No
23. How much does equipment balance impact your decision to move a shipment via intermodal? (check one.)	_____ 1 Not very much _____ 2 _____ 3 _____ 4 _____ 5 Completely

If you have comments or ideas regarding the survey or the freight study, please provide them on this page or attach separate page.

Appendix 7 - Shipper Survey

The following survey was sent to selected shippers. These shippers responded:

Air Products	Jabil Circuit Inc
Arlo Transportation	Lowe's
Autozone Inc	Michelin Tire North America
Best Buy - Staunton DC	Mohawk Industries
Boise Cascade	Owens-Illinois Glass Containers
Chevron Products	Ozburn Hessey Logistics
Cooper Tire & Rubber	Parker Hannifin
Corning Incorporated	Quaker Foods & Beverage
Crown Cork & Seal	Rockwell Automation
Cummins Inc	UPS Supply Chain Solutions
Dole Packaged Foods	Walgreen
International Truck & Engine Corp	Weyerhaueser
ITT Industries (3PL)	

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Virginia I-81/I-95 Market Study

20. In evaluating a new intermodal product, what five things are most important to you?	
21. Do you have traffic in the 600-900 mile length of haul that could be moved via intermodal if a competitive product were offered?	Yes No
22. Would more frequent departures impact your intermodal decisions in the 600-900 mile length of haul category?	Yes No
23. How much does equipment balance impact your decision to move a shipment via intermodal? (check one.)	_____ 1 Not very much _____ 2 _____ 3 _____ 4 _____ 5 Completely

If you have comments or ideas regarding the survey or the freight study, please provide them on this page or attach separate page.

DRAFT

February 13, 2003

Dear Shipper:

The Virginia Department of Rail and Public Transportation – a public sector agency chartered to promote intermodal transportation activity in the State – is currently conducting a study of shippers' logistics needs, and how this agency, and the State Government, can best respond to those issues. A critical portion of this effort is obtaining information, insights and opinions from the public; i.e., freight shippers, receivers, carriers and suppliers.

We have engaged a team of professional consultants to gather information and perform analyses of the current and future situations concerning freight in Virginia. For the benefit of the State's efforts to improve regional logistics performance, we would appreciate your responding to interviews and telephone or mail surveys conducted by Wilbur Smith Associates on behalf of the Department.

The attached diagram **(Attachment 1)** depicts truck flows in the U.S. based on USDOT data. The Commonwealth of Virginia is concerned about the volume of that portion passing through the state and is trying to determine to what extent and under what conditions more of it might move by rail and rail intermodal. If you have or direct freight traffic that would utilize one of the depicted paths through Virginia, we desperately need your input in helping us to determine the attractiveness of rail intermodal transportation under various conditions. The alternatives are spelled out in the attached questionnaire.

The survey that is attached to this letter **(Attachment 2)** is divided into several parts, covering general information about your firm, your inbound and outbound transportation flow patterns and volumes, and some questions about your experience with rail intermodal transportation. The final section offers a series of service alternatives, and the relative attractiveness of each to your distribution needs. It is important to answer all the questions, so that we can identify and then prioritize transportation spending to meet the greatest needs of the region's shipping community. Responses can be mailed back in the return envelope provided, or faxed back to the consultant at (803) 251-2922, to the attention of Richard Taylor.

The results of this research project will be of significant value in planning future transportation investment strategies for the State. In turn, these results depend heavily on responses of those involved in transportation activity today. In exchange for participation, we will share a portion of the survey results with each of the respondents. These results – currently expected to be mailed out in mid-March – should provide some valuable insight into the logistics patterns and preferences of shippers in the region.

Thank you for your cooperation and valuable input to this important analysis.

Yours sincerely,

Whittington W. Clement
Secretary of Transportation

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Virginia I-81/I-95 Market Study

Attachment No. 2

INTERMODAL MARKETING SURVEY

Company ______________________

Address ______________________

____

____

Contact

Name ______________________

Title ______________________

Telephone ______________________

Fax ______________________

E-mail ______________________

---

1) In your firm, how are freight transportation decisions generally made?

a) Directly with carrier

____

b) Third party, IMC/logistics provider

____

c) other (identify) ______________

---

2) Please look at the attached map, then tell us which flows (region-to-region) describe your truck shipments that would pass through Virginia. Please tell us the estimated number of truckloads, per (check one):

Volumes indicated are in truckloads per: (check one)

Year ___ Month ___ Week ___ Day ___

	Flow			Truckloads	Commodities
A)		to			
B)		to			
C)		to			
D)		to			
E)		to			

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Virginia I-81/I-95 Market Study

Note: Attach extra sheet for additional flows.

3) Do you also use other modes of transportation for these markets, and if so please indicate relative use below.

	Percent of use				
Mode	A	B	C	D	E
Highway					
Rail Carload					
Rail Intermodal*					
Waterborne					

*TOFC/COFC

---

4) If you use rail intermodal, what have you found to be it's greatest a) advantage or b) disadvantage?

a) Advantage

- ☐ Cost
- ☐ Service Reliability
- ☐ Transit Time
- ☐ Ease of use
- ☐ Loss/Damage
- ☐ Accessibility
- ☐ Other, Please Specify ______________________

b) Disadvantage

- ☐ Cost
- ☐ Service Reliability
- ☐ Transit Time
- ☐ Ease of use
- ☐ Loss/Damage
- ☐ Accessibility
- ☐ Other, Please Specify ______________________

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5) Are there specific problems you have found in the use of rail intermodal that have deterred you from further or expanded use?

____

____

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Virginia I-81/I-95 Market Study

6) Here is a list of typical criteria used by shippers in making freight carrier selection decisions. Please tell us the relative importance of each to you by distributing 100 percentage points among them (you can assign zero to some, but the total should equal 100).

	Percent
On-Time Performance	
Transit Time	
Price	
In-Transit Visibility	
Equipment Supply	
Equipment Type	
Loss/Damage	
Geographic Coverage	
Financial Stability	
Other (describe):	

7) For the traffic movements listed in Question 2 earlier, what transit time (expressed in days/hours) would be required to interest you in rail intermodal, assuming your logistics costs are comparable to over-the-road truck.

		Rail Intermodal	
Movement	Door-to-Door Highway Transit Time (days/hrs, indicate one)	Same	+/- (day/hrs, indicate one)
A			
B			
C			
D			
E			

DRPT

Virginia I-81/I-95 Market Study

8) Measuring the relationship between transportation rates and transit time performance is an important element of estimating the competitiveness of rail intermodal services. If current truck costs are represented by 100% and current truck transit times are also represented by 100%, what reduction in rail intermodal rates would be necessary to interest you in rail intermodal at the following increases in transit time?

a) A 5% **increase** in transit time requires a ______% reduction in rates.
b) A 10% **increase** in transit time requires a ______% reduction in rates.
c) A 25% **increase** in transit time requires a ______% reduction in rates.

If rail service provided for a decrease in transit time, would you be willing to pay a premium, and how much under the following scenarios?

a) A 5% **reduction** in transit time would be worth a ______% rate premium.
b) A 10%.**reduction** in transit time would be worth a ______% rate premium.
c) A 25% **reduction** in transit time would be worth a ______% rate premium.

---

9) What percentage of the traffic listed in Question 2 would you consider shifting to rail intermodal if the transit time/price combinations in Question 8 were available (you may select one or multiple categories, but columns should total to 100%).

	Question 2 Flows				
Transit Time Change	A	B	C	D	E
25% Increase	______	______	______	______	______
10% Increase	______	______	______	______	______
5% Increase	______	______	______	______	______
No Change	______	______	______	______	______
5% Decrease	______	______	______	______	______
10% Decrease	______	______	______	______	______
25% Decrease	______	______	______	______	______

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Virginia I-81/I-95 Market Study

Here are some questions about on-time delivery performance for your inbound and outbound truck shipments. Just tell us about truck shipments where you are using a commercial motor carrier, not your private fleet (if you have one).

How do you measure on-time delivery performance? (Check all that apply)

- We track every shipment through delivery
- We track a scientific sample of shipments
- We usually track only the "hot", urgent shipments
- We rely on our customers to report delivery problems
- We rely on motor carriers to report their performance
- We track shipments for a carrier or customer if we hear of a problem
- We don't really measure it
- Other (describe): __________

1) Say you are comparing the on-time delivery performance of two motor carriers you currently use. Assume you are measuring performance in terms of percents, where 90% on time means 9 out of 10 shipments arrive on schedule. Everything else being equal (price, equipment supply, relationship, etc.), how much better would the performance of one carrier have to be for you to take all or most of your business away from the other carrier?

- 2 percentage points or less (e.g. 90% versus 88%)
- 2 to 5 percentage points
- 5 to 10 percentage points
- Over 10 percentage points

12) What is an acceptable range for transit time variability?

Category	**Early** (days/hrs, indicate one)	Late (days/hrs, indicate one)
On-Time		
Early/Late, but acceptable		
Early/Late and Unacceptable		

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Virginia I-81/I-95 Market Study

13) Call Richard Taylor at (803) 251-2040 if you have any questions.