

REPORT OF THE  
DEPARTMENT OF TRANSPORTATION ON THE

**Desirability and Feasibility  
of Establishing Additional  
"Intermodal Transfer Facilities"**

TO THE GOVERNOR AND  
THE GENERAL ASSEMBLY OF VIRGINIA



**HOUSE DOCUMENT NO. 23**

COMMONWEALTH OF VIRGINIA  
RICHMOND  
2001





# COMMONWEALTH of VIRGINIA

Office of the Governor

James S. Gilmore, III  
Governor

December 7, 2000

Shirley J. Ybarra  
Secretary of Transportation

The Honorable James S. Gilmore, III  
Members, Virginia General Assembly

Dear Governor Gilmore and General Assembly Members:

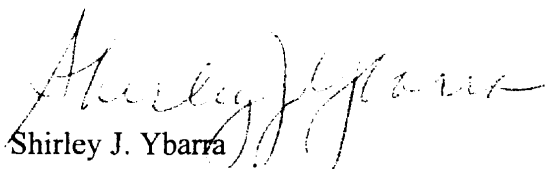
In accordance with the provisions of House Joint Resolution 704, which was passed by the 1999 General Assembly, the Virginia Department of Transportation (VDOT) and the Department of Rail and Public Transportation (DRPT) have undertaken a study concerning the desirability and feasibility of establishing additional intermodal transfer facilities in the Commonwealth. If warranted, possible benefits of such expansion include decreased shipping costs paid by the shipper and elimination of excessive volumes of truck traffic from the overcrowded long-haul highways of Virginia.

Please be advised that this study addresses only the feasibility of addition of intermodal facilities, as established by HJR 704. Senate Joint Resolution 55, which was passed by the 2000 General Assembly, requested that the scope of the original study be expanded to include an evaluation of the potential for shifting Virginia's highway traffic to railroads. The findings of that analysis are presented in a separate report.

At this time, the analysis of traffic data indicates insufficient potential for intermodal service outside of the Hampton Roads and Northern Virginia regions, both of which already have intermodal facilities. However, in light of continuing business activity by Norfolk Southern Corporation and CSX, technological innovations, economic behavior in general, and possible federal or state legislative or regulatory decisions, the analysis should be repeated periodically to monitor the efficiency and effectiveness of intermodal transportation.

As always, please let me know if you have questions.

Very truly yours,

  
Shirley J. Ybarra



## **Preface**

The Secretary of Transportation was requested by the 1999 General Assembly through passage of House Joint Resolution (HJR) 704 to conduct a study, with the assistance of the Virginia Department of Transportation (VDOT) and the Department of Rail and Public Transportation (DRPT), concerning the desirability and feasibility of establishing additional intermodal transfer facilities in the Commonwealth.

The two agencies agreed that VDOT's Transportation Planning Division (TPD) would assume the lead in preparing the study. TPD engaged the services of a consultant, Parsons Brinckerhoff Quade & Douglas, Inc. (Parsons Brinckerhoff), to compile the data and perform the analysis. This report addresses only the possible expansion of intermodal transfer facilities in the Commonwealth. Senate Joint Resolution (SJR) 55, passed by the 2000 General Assembly, directed the scope to be expanded to determine if Virginia's highway traffic could be diverted to railroads. The findings of that analysis are presented in a separate report. Both resolutions appear as appendices to this report.



## Table of Contents

Preface.....	<i>i</i>
Table of Contents.....	<i>iii</i>
Executive Summary.....	1
Introduction.....	5
Definitions.....	5
Methodology .....	8
Data.....	9
Analysis and Findings.....	12
Conclusion and Recommendations.....	15
Appendices:	
Appendix A: House Joint Resolution No. 704.....	19
Appendix B: Senate Joint Resolution No. 55 .....	21
Appendix C: Virginia Intermodal Feasibility Study .....	23





## Executive Summary

As directed by HJR 704, the Virginia Department of Transportation (VDOT) and the Department of Rail and Public Transportation (DRPT) collaborated to prepare a study concerning the desirability and feasibility of establishing additional intermodal transfer facilities in the Commonwealth. The study evaluated the location and traffic patterns at major production and market centers within the Commonwealth (Northern Virginia, Hampton Roads, Richmond, and Roanoke), as well as locations with ports operated by the Virginia Port Authority (Norfolk, Portsmouth, Newport News, and Front Royal). The primary purpose was to ascertain if additional intermodal facilities would help divert significant portions of truck traffic from congested interstate highways, such as I-95 or I-81. Anticipated ancillary benefits of such an expansion would include reduced shipping costs and enhanced competitiveness of the Commonwealth relative to other locations in the region.

The report analyzes long-haul truck traffic using Virginia highways. In evaluating the factors that improve the competitiveness of rail in comparison to freight trucking, analysts recognized the following points:

- The distance between origin and destination should exceed 500 miles;
- Some goods are more likely to be diverted from trucks to rail than others;
- Intermodal transfer facilities must be available at both origin and destination;
- Rail service must be responsive to the needs of both businesses and market;
- Businesses and market should show some degree of growth or stability (e.g., positive changes in demand, population, income, employment, etc.); and
- External conditions should lower or stabilize costs of doing business (e.g., availability of financing, effects of trade agreements, degree of regulation, etc.).

Nine regional centers encompass the Commonwealth of Virginia (Washington, DC – Baltimore; Salisbury MD; Richmond, VA; Staunton, VA; Roanoke, VA; Winston-Salem, NC; Norfolk, VA; Johnson City, TN; and Lexington KY). These regions are known as Bureau of Economic Analysis Economic Areas (BEA). BEAs recognize economics rather than political boundaries, and represent a more meaningful method of monitoring activity in a given area. Of these nine BEAs, only Richmond is concentrated entirely within the boundaries of the Commonwealth. The others include counties in the surrounding states.

The study listed factors that influence the decision to establish one or more intermodal facilities. These include the following:

- The presence of large sea ports;
- A large population providing a consumer base;
- A large manufacturing or distribution traffic base;
- A distance of over 500 miles between origin and destination;
- A minimum of 25,000 shipments annually to and from no more than 2 or 3 geographically similar BEAs; and
- Generally balanced volumes (return trips).

Many of these criteria are met under current conditions. The Commonwealth has five ports, three in Hampton Roads, one at Front Royal, and one at Richmond. (Note: Due to limitations in the ability of the database to discriminate among traffic volumes at every port, Richmond was not explicitly addressed in the study.) Hampton Roads is ranked twenty-seventh in the nation for population. Major production and market centers are located in four Virginia BEAs (Northern Virginia/Washington, DC/Baltimore; Hampton Roads; Richmond; and Roanoke). Finally, due to its location and width, Virginia attracts truck traffic from many BEAs throughout the mid-Atlantic, the Midwest, and elsewhere.

However, some criteria are not met. One criterion was whether the minimum requirement of 25,000 trips annually for an intermodal facility was satisfied at any of the BEAs. Of the nine BEAs associated with Virginia, five already have intermodal transfer facilities. Of the remaining four, none have enough traffic going to or coming from three or less other BEAs which are relatively close to each other. The table below presents specific information:

**Table 1**  
**Annual Inbound / Outbound Trips for Richmond and Roanoke**

Virginia BEA	Inbound Total	Outbound Total	Sum of Inbound and Outbound Totals
Richmond's Top 3 Inbound:	13,000	2,600	<i>15,600</i>
Richmond's Top 3 Outbound:	2,250	7,700	<i>9,950</i>
Roanoke's Top 3 Inbound:	7,000	2,700	<i>9,700</i>
Roanoke's Top 3 Outbound:	2,200	4,800	<i>7,000</i>

All of the totals in the far right column are far below the 25,000 trips required to warrant the construction of a new intermodal transfer facility. Furthermore, there is an inadequate balance between inbound and outbound trips, indicating a high number of empty returns. Therefore, two decision-making criteria were not met, based on the data examined.

Of course, economic factors fluctuate markedly with the business cycle, the nature and extent of regulation, choices of financing, technological innovation, foreign and domestic events, and other operational and strategic decisions made by stakeholders. Therefore, the study should be repeated at regular intervals to ensure that the conclusions reflect the most current conditions.



## **Introduction**

The concept of intermodalism in the transport of freight is not new. Centuries ago, before the invention of the train, automobile and airplane, the cart and horse, barge and the quintessential cargo ship were widely used to move raw materials and manufactured goods from one market to another. Traditionally, intermodalism was considered when markets were separated by land and water. It was, in this case, necessary to use more than one mode of transportation (thus, *inter*-modal transportation) to convey goods and materials between these markets for obvious reasons.

But because land transport was very difficult and therefore impractical, most centers of manufacturing and retail were located in port cities or on rivers where goods were transported by barge. With the advent of railroads as a viable transportation alternative, more communities along established rail lines began to grow significantly. Today, trucks have made every community readily available to the market and the truck's freedom of movement has made it the mode of choice for competitive businesses. Although truck transfer is more expensive per mile than rail transfer for long hauls, getting goods to the market sooner and on time has been the key to success for many businesses. Therefore, trucks have become the mode of choice. Now, the intermodal transfer of freight has become the choice of economy, not the choice of necessity.

As a result of economic growth, demographics and the geology of Appalachia, the Interstate 81 corridor has become a major artery of commerce. Demand for prompt delivery of materials and goods has increased over time, and the capacity of the network of interstate highways, and its ability to provide safe and convenient movement of people and goods, has been met or exceeded. Given the increasing expense and time involved in providing new or expanded interstate highways, the General Assembly requested the Virginia Department of Transportation (VDOT) and the Department of Rail and Public Transportation (DRPT) to evaluate the situation. This report addresses the issues and concerns raised by House Joint Resolution 704, and answers the question of the feasibility of establishing new intermodal services in Virginia, possibly leading to a reduction in truck traffic on all of Virginia's major interstate highways. The technical report by Parsons Brinckerhoff Quade Douglas, is referenced in an appendix to this report.

## **Definitions**

### **Mode**

A form of transportation: Truck, train, cargo airplane, and cargo ship are the most common modes of freight transportation.

## **Intermodal freight**

Freight or goods which are shipped from origin to destination using more than one mode. In the case of this study, the focus is on the truck to train and train to truck transfer. Also used to describe the subject of intermodal freight movement. Intermodal freight is packaged in many forms, depending on the equipment used: trailers placed on flat-cars (TOFC) and containers (most slightly smaller than a [tractor] trailer) on flat cars (COFC) are some of the most common methods of intermodal freight containerization.

### **BEA**

Refers to a group of counties in an economically contiguous region as determined by the Bureau of Economic Analysis (officially called a Bureau of Economic Analysis Economic Area). Frequently, the boundaries of BEAs cross state lines. A map of the BEAs associated with Virginia is shown by MAP 1 (see next page).

### **Origin**

Where the shipment begins its trip

### **Destination**

Where the shipment concludes its trip

### **Divertible or "Dry van"**

Freight which is suitable or eligible for Intermodal rail transportation (but not currently using intermodal rail). Some goods, do not travel well by train (e.g. some electronic goods, perishable foods, etc.).

### **Diversions**

When divertible freight is transported by intermodal rail transportation *when it used to be* transported by truck.

### **Inbound**

Generally speaking, an *inbound* trip (or, traffic) refers to a trip (or, traffic) which begins outside Virginia and ends inside Virginia.

### **Outbound**

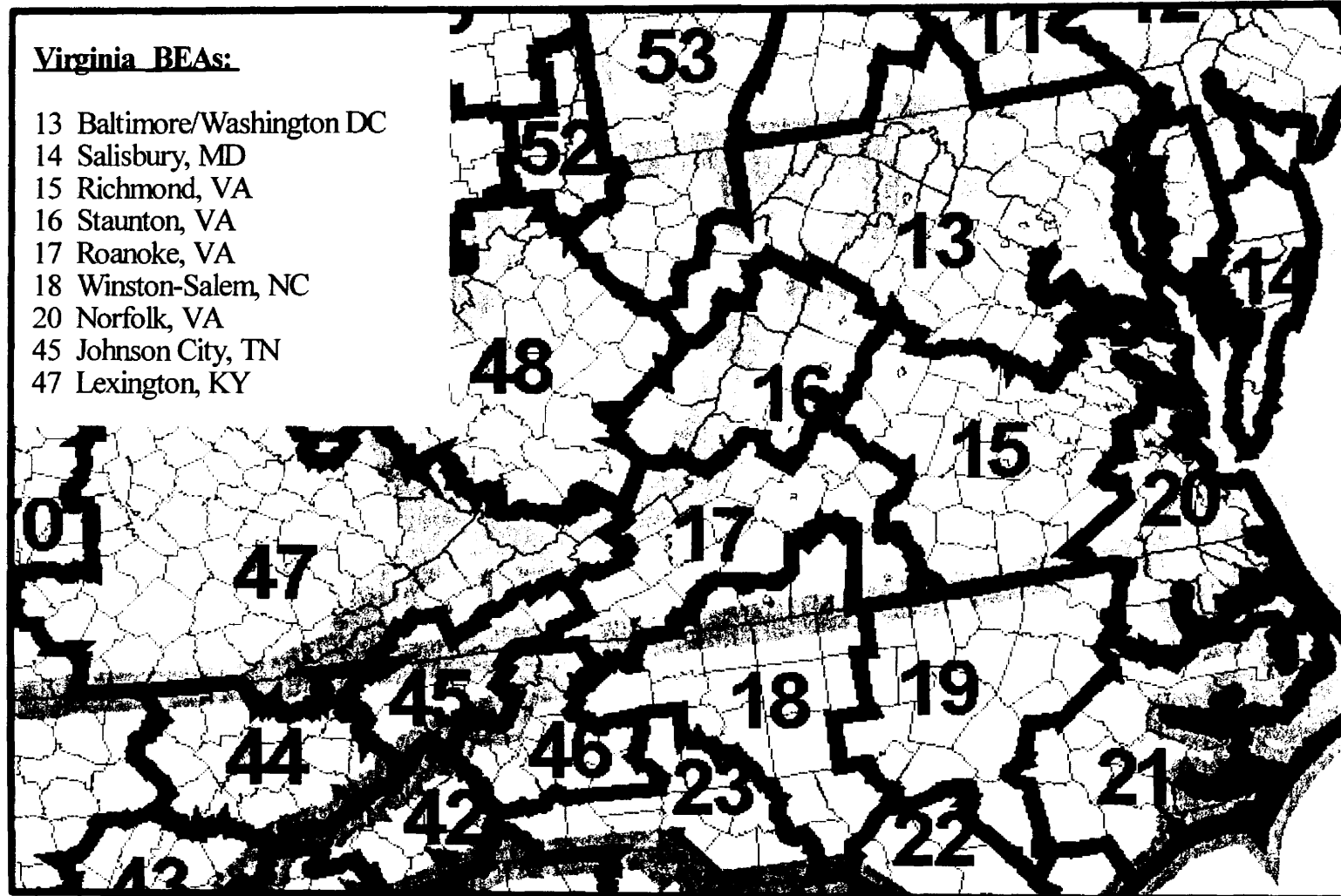
Generally speaking, an *outbound* trip (or, traffic) refers to a trip (or, traffic) which begins inside Virginia and ends outside Virginia.

### **Through**

Generally speaking, a *through* trip (or, traffic) refers to a trip (or, traffic) which begins outside Virginia and ends outside Virginia. Through trips are also called "overhead."

**See the *Glossary of Terms* in the technical report (*Appendix C*) for additional definitions.**

**MAP 1: Bureau of Economic Analysis Economic Areas  
(BEA)**



## **Methodology**

In August 1999, a meeting of public and private transportation stakeholders, including rail, trucking, port, and state government representatives was conducted in order to identify the issues and discuss the criteria by which decisions are made in the intermodal freight business. The following is a list of the basic criteria used by the industry and this study to determine the feasibility of new services:

### **Market Characteristics**

Intermodal services are more successful when the origin and destination market regions have:

- A large sea port;
- A large population providing a consumer base;
- A large manufacturing or distribution traffic base;
- Are separated by a distance of 500 miles or greater;
- A minimum 25,000 annual dry van shipments to and from no more than 2 or 3 geographically similar BEAs; and
- Generally balanced volumes (return trips)

Other important factors influence the use of intermodal services. Companies generally require regularity and reliability from the intermodal rail link. If the rail company fails to have available services, or the percentage of on-time shipments does not meet the customer's expectations, the customer will choose to use trucks despite their greater expense. The potential customer's flexibility on these issues weighs heavily in determining success.



## **Physical Characteristics**

After establishing the feasibility for new intermodal services, finding the location of the new facility is the next task. A successful intermodal terminal is located on land that is:

- At least 30 acres in size;
- At least 3000 feet in length (deleted space);
- Adjacent to a main rail line;
- Easily accessible to the interstate system;
- Properly zoned;
- Relatively flat; and
- Environmentally suitable

In conducting this study, the identified traffic volumes did not justify new services; therefore it was not necessary to locate a new facility.

## **Data**

To adequately address the criteria in the methodology, information regarding the volume of freight traffic on Virginia's highways needed to be collected. Specific data concerning type of cargo, point of origin, destination, and annual number of shipments were required for the analysis. At the August 1999 stakeholders' meeting, the moderator noted that truck drivers are often unwilling or unable to divulge information regarding their load. Also, a survey of this magnitude would take an enormous amount of time and money to collect.

Reebie Associates, a Stamford Connecticut firm, collects survey data from motor carriers across the United States through an exchange program which provides the motor carriers market data for their own strategic planning. The survey data, along with several public data warehouses and economic indices, including the Commodity Flow Survey conducted by the Bureau of Transportation Statistics, an agency under the USDOT, is used to develop a national profile of estimated goods movements. The database, known as TRANSEARCH, is published annually and sold in increments that fit the needs of the purchaser.

The data purchased for this study was the 1996 TRANSEARCH data, the most current base-year data available with county-to-county detail. The values are listed in the tables of the database in the following format:

**TABLE 1**

**Database Format**

<b>Origin</b>	<b>Destination</b>	<b>Intermodal</b>	<b>Truckload</b>	<b>Less-Than-Truckload (LTL)</b>	<b>Private</b>
<i>Market region where the shipments began the trip (e.g. New York, NY)</i>	<i>Market region where the shipments ended the trip (e.g. Atlanta, GA)</i>	<i>Number of shipments which utilize intermodal rail services (the purpose of this study is to see where the values in this column could increase in the future)</i>	<i>Number of shipments made by fully loaded trucks</i>	<i>Number of shipments made when the trucks were only partially loaded</i>	<i>Number of shipments made by manufacturers or distributors who own their own fleet of trucks</i>

The base TRANSEARCH data also includes columns for the commodity (e.g. *FELT GOODS, TEXTILE BAGS, etc.*); however, many commodities are not suitable for rail transport (e.g. *some electronic goods, some perishable foods, etc.*). For the purpose of this study, only the commodities suitable for rail transport ("dry van" goods) were listed in the database. For a significant cost savings, the "commodity" detail was omitted and the shipments shown only by load (either truck or intermodal rail). The following list summarizes the criteria by which the database was built for this study:

**The data contains shipment quantities which:**

**Travel on Virginia highways**

- whether inbound, outbound or through (also called "overhead").
- on ANY and ALL of Virginia's highways: interstates and primaries.

**Travel at least 500 miles**

- Some listed shipments travel *reasonably* less than 500 miles, but the database generally excludes local trips under 500 miles.

**Are suitable or eligible for intermodal transfer**

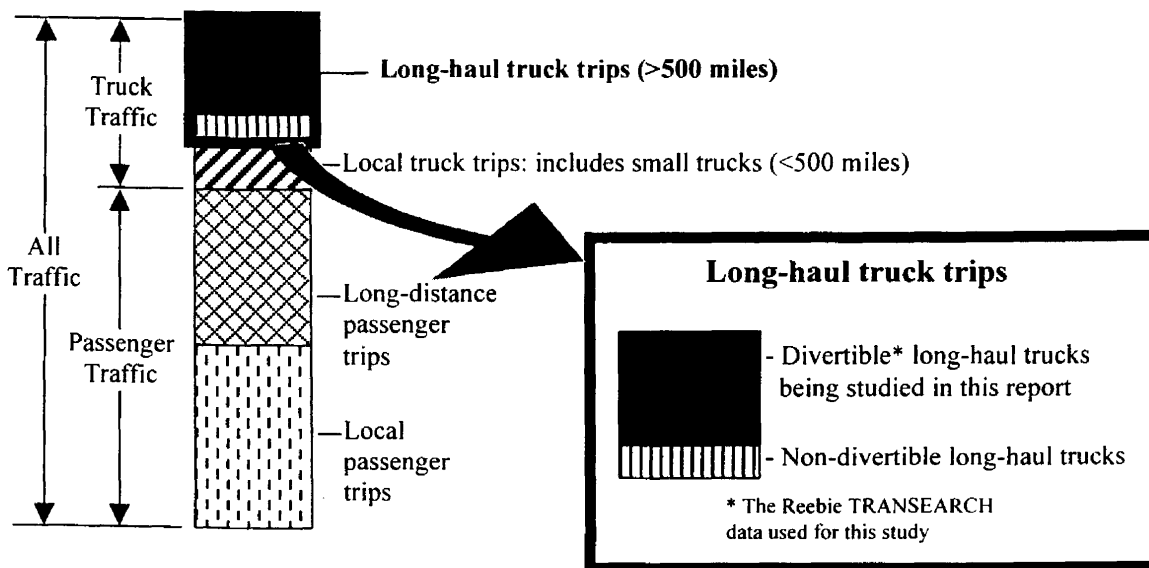
- excludes goods which for various reasons *cannot* be transported by rail.

**IMPORTANT NOTE:**

The information reported in this study as reported can be easily misunderstood or misused without an awareness of what the data actually represent. The values and percentages reported from this data do not reflect the total traffic base on any segment of Virginia's highways. The actual percentage of long haul, dry van traffic on any segment of highway varies with the volume of the rest of the traffic. The numbers reported in this study refer to the *potential* or *lack of potential* that lies in the freight traffic flow to divert to rail. See Diagram 1 for an illustration of what the database represents.

**DIAGRAM 1**

**Basic Traffic Composition**



The purpose of this diagram is to illustrate what part of the traffic this study addresses. The proportions shown are arbitrary and thus do not represent any real segment of highway. The numbers and percentages reported in this study reflect *total annual trips*, unless stated otherwise.

## Analysis and Findings

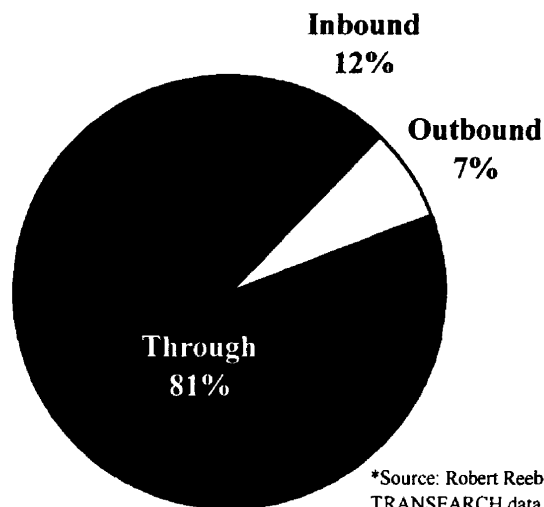
The first step in determining the potential for new intermodal services is to look at the overall long-haul freight traffic profile. Table 2 and Chart 1 summarize the total divertible (long-haul, dry van) traffic traveling Virginia's highways in 1996.

**TABLE 2**  
**Total Divertible Long-Haul Truck/Intermodal Trips**

	<b>Intermodal</b>	<b>Trucks</b>	<b>Total</b>
<b>Through</b>	359,027	2,839,256	<b>3,198,283</b>
<b>Inbound</b>	127,552	432,963	<b>560,515</b>
<b>Outbound</b>	103,114	243,120	<b>346,234</b>
<b>Total</b>	<b>589,703</b>	<b>3,515,339</b>	<b>4,105,032</b>

**CHART 1**

**Total Virginia Divertible Long-Haul Truck Trips\***



\*Source: Robert Reebie Associates' 1996  
 TRANSEARCH data

**Indications:**

1. Eighty-one percent of the divertible long-haul trucks traveling on Virginia highways are traveling *through* Virginia.
2. This chart represents divertible long-haul (500 miles) truck traffic on ALL of Virginia's highways (Interstates 66, 64, 77, 81, 85, 95 etc.; Routes 1, 11, 460, 29, 17, 301, etc.)
3. This chart represents approximately 7,800 to 10,900 divertible long-haul trucks daily traveling through Virginia (all highways).
4. This chart indicates that the greater potential for diversion is with the through traffic.
5. For a more detailed analysis of the data, please see the technical report (*see Appendix C*).

The question remains: Is there enough inbound and outbound traffic in Virginia to warrant or justify investing in or establishing a new intermodal transfer facility? Table 3 details the Virginia inbound and outbound traffic:

**TABLE 3**

**Virginia In-State and Out-of-State\* Totals Summary**

<b>BEA Name</b>	<b>Inbound</b>		<b>Outbound</b>	
	<b>Intermodal</b>	<b>All Trucks</b>	<b>Intermodal</b>	<b>All Trucks</b>
WashDC-Baltimore	43,435	322,643	40,627	77,957
Norfolk, VA	112,697	95,101	87,461	74,568
<i>Richmond, VA</i>	-	<i>74,275</i>	-	<i>55,231</i>
Winston-Salem NC	13,868	55,272	11,427	200,231
<i>Roanoke, VA</i>	-	<i>30,519</i>	-	<i>34,845</i>
<i>Salisbury, MD</i>	-	<i>29,925</i>	-	<i>17,554</i>
Johnson City, TN	445	13,964	1,466	27,707
Lexington, KY	12,099	11,834	16,883	11,072
<i>Staunton, VA</i>	-	<i>10,132</i>	-	<i>20,364</i>
<b>Grand Total</b>	<b>182,545</b>	<b>643,664</b>	<b>157,864</b>	<b>519,528</b>

- "Intermodal" = Shipments by container or trailer on flat car already using rail intermodal services
- "All Trucks" = Only divertible long-haul (>500 miles) shipments. This does not include short "local" shipments
- All values reflect the annual number of trips
- The presence of intermodal services in Kentucky and Tennessee, where long-haul truck volumes are low, reflect a highly specialized market with an adequate distance to travel.
- \* Includes out-of-state portions of Virginia traffic (See Map 1).



## **APPENDICES**





## **Appendix A: House Joint Resolution No. 704**

Requesting the Secretary of Transportation to study the desirability and feasibility of establishing additional intermodal transfer facilities.

Agreed to be the House of Delegates, February 9, 1999

Agreed to by the Senate, February 23, 1999

WHEREAS, through the mechanism of the Inland Port at Front Royal, Virginia is able to collect truck-hauled containerized freight at the Inland Port in sufficient quantities to transport it in unit trains directly to the Ports of Hampton Roads, not only holding down costs paid by the shipper, but also eliminating a substantial number of trucks from the overcrowded long-haul highways of eastern Virginia; and

WHEREAS, by establishing other facilities in Virginia and working cooperatively with other states to encourage the establishment of similar facilities within their boundaries, a network of intermodal transfer facilities might be established that could prove useful in reducing heavy truck traffic on other long-haul highways in the Commonwealth, particularly Interstate Route 81; and

WHEREAS, additional intermodal transfer facilities need not necessarily handle only cargoes with a seaport or river port as their origin or destination, nor would unit trains linking these facilities necessarily be limited to transporting containers typically used in maritime commerce, but might employ a variety of "piggy-back" container, trailer, or semitrailer configurations; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Secretary of Transportation be requested to study the desirability and feasibility of establishing additional intermodal transfer facilities. The Department of Transportation and the Department of Rail and Public Transportation shall assist the Secretary in the conduct of the study. Other agencies of the Commonwealth shall provide assistance to the Secretary, upon request.

The Secretary shall complete her work in time to submit her findings and recommendations to the Governor and the 2001 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.



## **Appendix B: Senate Joint Resolution No. 55**

Requesting the Secretary of Transportation to expand the scope of her study on the desirability and feasibility of establishing additional intermodal transfer facilities (House Joint Resolution No. 704 (1999)) to include the potential for shifting Virginia's highway traffic to railroads.

Agreed to by the Senate, February 15, 2000

Agreed to by the House of Delegates, March 8, 2000

WHEREAS, safety is a primary goal of the Commonwealth's transportation program; and

WHEREAS, many of the Commonwealth's interstate highways are experiencing an erosion of safety as the result of staggering increases in traffic; and

WHEREAS, one acute example of this situation is Interstate Route 81, whose design intended the facility to carry no more than 15 percent of its total traffic volume as truck traffic, but whose current traffic is made up of as much as 40 percent trucks; and

WHEREAS, widening Interstate Route 81 alone is estimated to cost in excess of \$3 billion and take at least 10 years to complete, with similar improvements to other interstate highways with high traffic volumes costing comparable amounts and requiring no less time; and

WHEREAS, it may be both desirable and feasible in the short term to alleviate excessive volumes of traffic on Interstate Route 81 and other interstate highways in Virginia to seek to shift traffic on our highways to trains on our railroads; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Secretary of Transportation be requested to expand her study on the desirability and feasibility of establishing additional intermodal transfer facilities (House Joint Resolution No. 704 (1999)) to include the potential for shifting Virginia's highway traffic to railroads. The request to conduct this study shall be contingent upon the availability of funding and assistance from private industry or other sources.

The Department of Transportation and the Department of Rail and Public Transportation shall assist the Secretary in the conduct of the study. Other agencies of the Commonwealth shall provide assistance to the Secretary, upon request.

The Secretary of Transportation shall complete her work in time to submit her findings and recommendations to the Governor and the 2001 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.



## Appendix C: Virginia Intermodal Feasibility Study

On the basis of an agreement between VDOT and DRPT, VDOT's Transportation Planning Division engaged the services of a consultant, Parsons Brinckerhoff, to analyze freight traffic data and make recommendations on the feasibility of establishing additional intermodal freight transfer facilities in Virginia. The consultant identified criteria influencing how businesses choose to ship freight, and evaluated a number of factors, including:

- All divertible long-haul freight movements;
- Long-haul freight movements by Interstate;
- Long-haul freight movements inside and outside Virginia;
- Long-haul truck traffic by major market areas in Virginia; and
- Efficiencies of existing intermodal facilities inside and outside Virginia.

The report represents a baseline resource for state transportation and commerce officials and the business community in making decisions on how intermodal improvements should be funded, what types of improvements should be constructed, along with competitiveness and regulatory issues. A copy of the technical report, which contains comprehensive data on long-haul truck traffic and demographic/economic factors, is available on-line at:

[http://www.vdot.state.va.us/proj/Other\\_areas/vaintermodalx.html](http://www.vdot.state.va.us/proj/Other_areas/vaintermodalx.html)

To request a copy by mail, send a letter requesting the "HJR 704 Technical Report" to:

Erik Johnson  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, VA 23219

To email your request, send message to [johson7\\_el@VDOT.state.va.us](mailto:johson7_el@VDOT.state.va.us). For questions or to request a copy of the technical report by phone, call (804) 371-0811.

