Defining the I-81 Corridor Boundary based on its Influence to Attract Highway Trips

by

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Project and Report submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

IN

CIVIL ENGINEERING

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May 10, 1996

Blacksburg, Virginia

Keywords: I-81, Corridor, Boundary, Definition

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Corridor coalitions have provided the necessary framework for the deployment of Intelligent Transportation Systems on a corridor-wide basis. The new federal transportation bill of 1997 is projected to support this type of planning application well into the next century, and there will be a growing need to define corridor boundaries as more coalitions are formed. A methodology to set these corridor boundaries quickly and without elaborate data collection is necessary as planners begin to analyze a particular corridor's needs.

The proposed methodology presented within this report uses shortest path criteria and macroscopic traveler modal choice to fulfill these requirements and defines the potential market of users for I-81. Since origin-destination data is not readily available, the geographic location of cities in relation to a particular interstate highway becomes important as one defines the interstate's influence upon a particular city to attract trips. In this study, the criteria for a major origin or destination to be included in the corridor are based upon three parameters:

- City size must be over 50,000 in population
- The Origin - Destination (O-D) pair must use I-81
- O-D pair must be within the shortest path distance of 368 miles

By using the proposed methodology to define the corridor boundary, 85% of the automobile travel and approximately 78% of the truck travel have an origin or destination within the corridor boundary. Future research and validation of this boundary definition needs to be performed before this definition can be fully accepted.

Acknowledgments

I would like to give my sincere appreciation and a warm thank you to my advisor, Dr. Sivanandan. It is through Siva's efforts, direction, and input that this report is finished. He helped me to achieve the level of quality found within this report. In addition, I would like to thank Ray Pethtel and Dr. Antonio Trani. To Ray for providing me with valuable insight in my presentations and into my personality and to Dr. Trani for being a great professor and being available whenever I had a question. I would also like to thank Marjie Hendren and Do Nam. Marjie made this document completely free of grammatical errors and Do provided an excellent partner to tell me if and when I was making sense and he kept me on track. Without the cast of characters presented here this paper would not be a reality, THANK YOU.

Finally, I would like to thank Virginia Tech for six wonderful years and GO HOKIES!!!

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1.0 Background

1.1 A Multi-University, Multimodal Research Initiative

The Virginia Tech Center for Transportation Research, in cooperation with the Mid-Atlantic Universities Transportation Center (MAUTC), is developing a program of research, education, and technology transfer within the Interstate 81 corridor. This effort will involve the MAUTC universities as well as federal, state, and local public agencies, and private firms with an interest in the corridor. It is believed that a multi-modal, multi-disciplinary program of activities focused on the transportation issues important to this corridor will benefit the region and the states involved.

The I-81 Corridor Council was established in 1989 by Virginia's Planning District Commissions 1 through 7. The primary goals of the Council is to promote both economic growth and to enhance the quality of life along I-81. In 1990, the Council released the document "A Proposal for Strategically Developing the Interstate-81 Corridor Region" which addressed the need for establishing strategic alliances and partnerships with neighboring jurisdictions, government agencies, the private sector, and higher educational institutions within the region. It was in this strategic plan that twelve specific recommendations were identified for these new partnerships to complete. One recommendation expressed the need to define the corridor such that the following five items could be identified within the corridor:

- Economic, social, and political conditions
- I-81 trends

- Common interests and goals
- Additional research requirements
- Additional strategic and comprehensive planning needs

In order to fulfill the definition recommendation, the boundary of the I-81 corridor must be defined. One of the first steps in any transportation planning application is to define the boundary and scope of a proposed study. Limiting the study's focus to the area affected by the proposed study is important as it saves time and resources. Various methods have been used to define corridor boundaries; however, no real methodology has been developed as of yet to comprehensively and effectively complete this important first step. This paper attempts to define the corridor boundary over the entire length of Interstate 81 using macroscopic traveler modal choice and shortest path criteria. As a result, this boundary definition for I-81 will allow the potential marketing area of the interstate to be established as the potential users of the interstate are identified.

1.2 The Location of I-81

Interstate 81 connects the six states of Tennessee, Virginia, West Virginia, Maryland, Pennsylvania, and New York (See Figure 1.1). Its total length between Knoxville, TN and Watertown, NY is nearly 850 miles. Geographically, it is a main connection between the southern economic hubs of Atlanta, New Orleans, Houston, and Dallas, to the northeastern United States (Center for Transportation Research (CTR), 1996). In addition, it has been defined by the I-95 Corridor Coalition as the outer boundary of the I-95 corridor (I-95 Corridor Coalition, 1995).

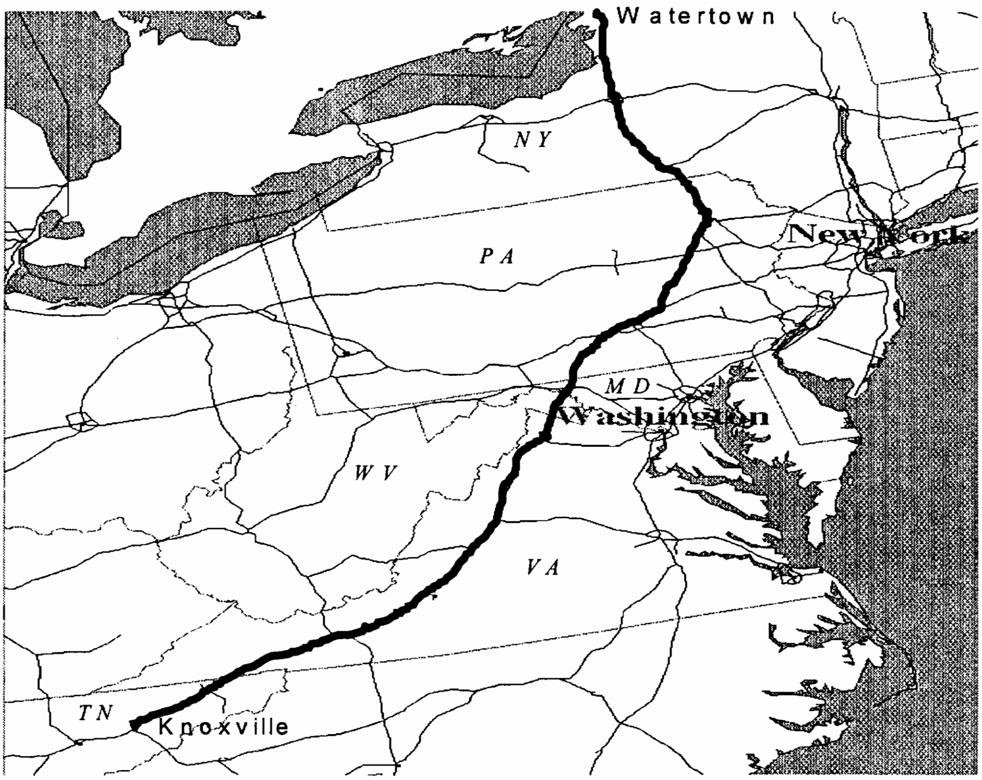

Figure 1.1: Location and alignment of Interstate 81

1.3 The Organization of this Report

There are four more sections in this report. Section 2.0 identifies through a literature review the various methods of defining corridor boundaries and makes specific reference to the I-81 corridor definition as it fits in with other genres of boundary definitions. In addition, other case studies which involve corridor definition will be reviewed. Section 3.0 presents the proposed methodology for defining the corridor boundary on I-81 for automobile travel using macroscopic traveler modal choice, and discusses the considerations of matching this boundary with truck travel patterns. Section 4.0 defines the corridor boundary for I-81 and verifies this boundary for truck travel within the corridor using weigh station origin-destination data. Section 4.0 also determines which origin-destination pairs outside of the corridor are expected to use I-81 based on a national study completed by Argonne National Laboratory. Finally, Section 5.0 discusses the results presented in Section 4.0 and suggests areas for future research.

2.0 Literature Review

2.1 Introduction

Several sources were used in this literature review. The Virginia Tech Library System (VTLS) and the Transportation Research Information System (TRIS) were two databases that were heavily utilized to find many of the resources presented in the following sections. It must be noted that not much attention has been given to corridor definition in the past fifty years, and as a result not many real methodologies exist to build upon. Section 2.2 identifies the types of boundaries that can exist and various techniques for defining a boundary. Section 2.3 discusses other case studies where corridor boundaries have been defined. Finally, Section 2.4 presents the background information for the proposed methodology and the considerations given for the chosen method.

2.2 Boundary Types and Definition Techniques

According to Bogg's Classification of Boundary Types, there are four principal genres of boundaries: physical, geometric, anthropogeographic, and complex boundaries (Jones, 1945). Physical boundaries are set by the natural geographic features found within a region, such as mountains, deserts, lakes, bays, straits, rivers, canals, swamps, territorial waters, and contour lines. Geometric boundaries are defined by fixed shapes such as straight lines, latitudinal and longitudinal lines, arcs of circles, or parallel lines to coasts or rivers. Anthropogeographic boundaries are defined for various human interests such as boundaries separating different tribes, languages, religions, economic classes, cultures or for historical reasons. Finally, a complex boundary is a combination of physical, geometric, or anthropogeographic (Jones, 1945). The boundary classification for the I-81 corridor definition presented in Section 3.0 will be a complex boundary combining the use of straight line geometrics with the anthropogeographic aspects of traveler modal choice.

There are three other categories by which each boundary can be defined. First, a boundary is either internal or international (where military protection is necessary for international boundaries and is not necessary for internal boundaries). Second, a boundary is either natural or artificial, where artificial boundaries are generally more stable and have less conflict. Natural boundaries form where natural demarcations exist or where populations are small. Finally, a boundary is either scientific or organic, where scientific boundaries have been determined from certain quantifiable measures and can be duplicated (Jones, 1945). The I-81 corridor boundary will be an internal, artificial, scientific boundary.

Seven primary methods of boundary definition exist for policy makers to establish various types of boundaries:

- Complete definition
- Complete definition with power to deviate
- Major turning points
- Courses and distances
- Zone
- Natural features
- Definition in principle

Each method of definition has its own unique applications. For instance, a boundary defined by 'definition in principle' may be used to split water resources evenly between two different tribes. A 'complete definition with the power to deviate' is a boundary that is explicitly defined, but can be slightly altered to a more feasible solution (Jones, 1945). I-81's corridor boundary will be defined by major turning points and will be described in Section 3.0.

Accessibility is a newer theory which can be utilized to set corridor boundaries. Based on Horton and Strahler's method of Stream Ordering, one can show similarities between transportation networks and drainage systems (Haggett, 1969). According to Peter Haggett, author of several books on geography and transportation systems, the existence or absence of a transportation facility dictates whether or not a resource is available. Haggett recognized that the freeways and interstates of the United States are like the major rivers of the world -- they have tributaries and create their own watersheds or vehicle sheds. Using graph theory and techniques such as nodal and route hierarchies, branching ratios, connectivity coefficients, network shape, and shortest path criteria, one could generate a corridor boundary that would define (in distance) a freeway's influence (Haggett, 1969).

Several quantifiable measures can be used to define the distance a roadway influences. Time distance (isocrones), Euclidean distance, physical features, economic cost functions, perceptual user choice, and traffic flow characteristics are some of the measures that can be used to define where a corridor's boundary should be placed (Lowe, 1975). When considering the I-81 corridor definition, a combination of the shortest time and perceptual modal choice will define the extent of auto travel on I-81.

2.3 Case Studies of Corridor Definitions

Corridor boundary definitions vary as the purpose of the boundary changes. The I-95 corridor runs from Augusta, Maine in the north to Norfolk, Virginia in the south, with the Atlantic Ocean providing a natural boundary in the east and interstates 81, 84, and 91 acting as the western boundary. The I-95 Corridor Coalition has defined its boundaries to be flexible so that no opportunities for partnerships will be missed, and to accommodate all that may travel through the corridor regardless of origin or destination. Therefore, the I-95 Corridor Coalition defines its corridor based on what appears to be natural and anthropogeographic boundaries (I-95 Corridor Coalition, 1995).

There are several other methods used to define study boundaries. For I-81, the Virginia Department of Transportation (VDOT) has three construction districts (Bristol, Salem, and Staunton) through which I-81 is aligned (VDOT, 1996). In Virginia, I-81 also traverses seven planning districts (Lenowisco, Cumberland Plateau, Mount Rogers, New River Valley, Fifth, Central Shenandoah, and Lord Fairfax) (CTR,1996). These planning districts gather socio-economic data for their region as well as develop strategic plans for their respective areas (CTR,1996). Either the construction districts or the planning districts could be used as a boundary to describe the surrounding area. In the next twenty years, I-81 will have to be widened in certain sections of its alignment, and environmental studies must be completed. For these studies, another boundary definition would be assigned. The corridor would be set to include a certain distance on either side of I-81's mainline, and this area would be analyzed for potential environmental impacts due to interstate reconstruction projects.

The economic impacts of I-81 on local land use offer yet another boundary definition. The I-81 Corridor Coalition has completed an Interchange Study to provide a detailed analysis of five interchange areas along particular sections of I-81. The choice of the corridors for each of the studies was based on coordination between the various planning district commissions and their respective county planning districts. The actual study corridors varied individually by site and were not defined by any strict criteria (I-81 Corridor Coalition, 1992).

Finally, four ITS Priority corridors have been established throughout the United States by the Federal Highway Administration. They are located in Southern California, Houston, Chicago, and the Northeastern United States. The four corridor boundaries were not set by any strict criteria, and varied by location. For instance, the Southern California boundary was established based on air districts and political boundaries in the area. In another example, the sixteen counties forming the three Metropolitan Planning Organizations of Chicago, Gary, and Milwaukee established the boundary for the Chicago ITS priority corridor. These priority corridors were not established based on the highway trips they attracted and used no real methodology to define their boundaries.

2.4 The I-81 Corridor Boundary Definition

2.4.1 Considerations

Several options for defining the I-81 corridor boundary were discussed before deciding on the methodology presented in Section 3.0. One of the important criteria in defining a highway corridor boundary is to determine the extent of the area which it influences in terms of attracting trips. This influence can best be determined through the analysis of intercity trip table data by identifying which Origin-Destination (O-D) pairs use I-81. The ideal solution would have been to use data from a large random sample of users obtained over a one year time period, during various times of the day, and along the entire length of I-81. This would account for changes in travel patterns due to the season, time of day, and geography. This type of data, however, does not exist and it would be very expensive to obtain. Since this data does not exist, the geographical location of a city was utilized as a surrogate measure to determine whether or not an O-D pair used I-81. Using the concept of geographical location in relationship to I-81, the next step analyzed the average trip length and how far one was willing to travel in an automobile before considering other modes (such as flight) as an alternative. This average trip length of 350 miles provides part of the criteria used to develop the proposed methodology, and is discussed in detail in Section 2.4.2.

2.4.2 Background for Proposed Methodology: The Air - Auto Modal Choice Line

The automobile is the predominant mode of transportation for all intercity trips. According to the 1994 Annual Report on Transportation

Statistics (Bureau of Transportation Statistics (BTS), 1994), over 80% of all trips greater than 100 miles are either automobile or truck trips (Figure 2.1). 55% of business trips use either the automobile or truck as the principal mode of transportation and 85% of all pleasure trips use this principal mode.

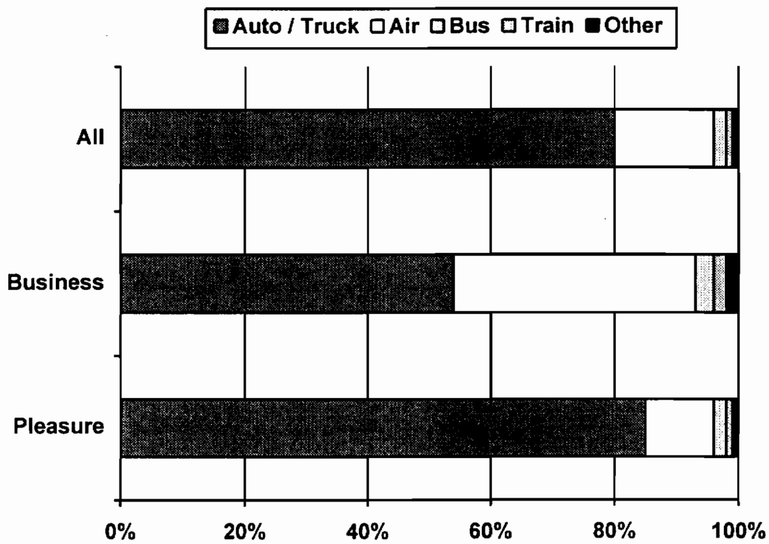

Figure 2.1: Modal Choice by Trip Purpose (1991)
(Source: Transportation Statistics Annual Report, 1994)

Modal choice for intercity travel is based upon two principal parameters: the trip's purpose, and the distance between the origin and destination. Business trips in 1990 averaged 862 miles round-trip for all of the modes. The average distance traveled for personal trips was less, at 799 miles round-trip. If all trips (business and personal) are analyzed by trip length, one notices that the modal choice of the lower trip-length categories gravitate towards the use of the automobile as opposed to air travel; however, as the distance between origin and destination increases, the usage of air travel increases as transportation users see the true benefits of aviation (See Figure 2.2). Air travel does not begin to dominate intercity travel until the round-trip flight distance is greater than 2,000 miles (BTS, 1994).

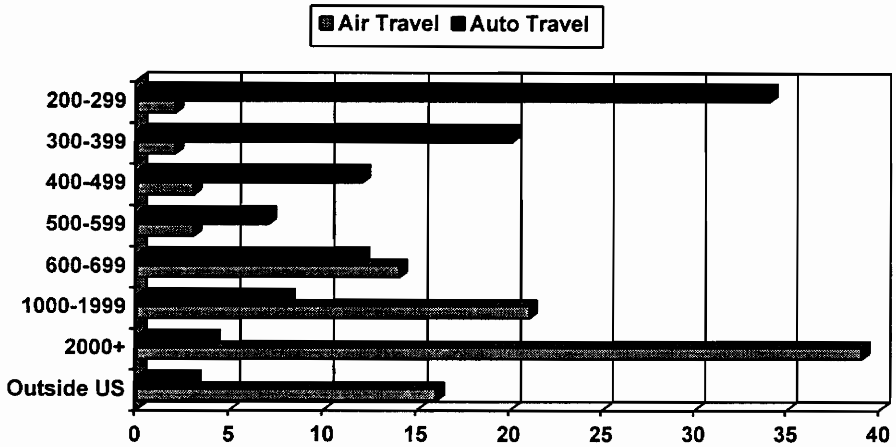

Figure 2.2: Air and Auto Trips by Trip Length (1990)
(Source: Transportation Statistics Annual Report 1994)

60% of all intercity auto trips are less than 500 miles round-trip. The average auto trip length is 577 miles round-trip. Air travel, on the other hand, only has 10% of its intercity trips under 500 miles with an average round-trip length of 2,200 miles. Approximately 3% of all auto trips are longer than 2,000 miles round-trip (compared to 40% of all air trips). Finally, looking at other modes, Amtrak has an average one-way trip of 290 miles, and intercity bus trips are approximately 140 miles in length one way (BTS, 1994).

From this 1991 survey, one notes that 85% of all intercity trips utilize the automobile to travel a one way distance of less than 350 miles. Therefore, it is plausible to use this trip length as a cutoff point to define the I-81 corridor boundary. As a result, the distance of 350 miles will be used to determine which cities should be included as a major origin or destination within a particular study region. Truck travel will be analyzed separately according to how well truck travel patterns match the corridor boundary definition for automobiles.

2.5 Summary

From the various resources gathered from the literature review, it becomes apparent that very little research has taken place in the past fifty years on defining corridor boundaries for planning applications. Using the air-auto modal choice line of 350 miles, and the shortest time path from major origins to destinations will provide the necessary criteria to develop the corridor boundary definition for I-81 based upon modal choice. In Section 3.0, the methodology for this approach will be discussed.

3.0 Methodology

3.1 Introduction

The methodology developed in the following sections will allow the I-81 corridor boundary to be defined using several parameters which will be introduced here and discussed further in sections 3.2 through 3.5. The definition of a major origin or destination will be discussed in Section 3.2. The shortest path criteria used in this study will be discussed in Section 3.3. In addition, the air-auto modal choice line developed in Section 2.4 will briefly be discussed again in Section 3.3. In Section 3.4, both a flow chart depicting the decision process of the proposed methodology and an illustrative example using this process will be presented. Finally, Section 3.5 will discuss the considerations for analyzing truck travel, and why it was important to check the corridor boundary defined by the proposed methodology with how well it represents truck travel on I-81. At the conclusion of Section 3, the final criteria that was used to define the I-81 corridor boundary will be summarized in Section 3.6.

The methodology for defining the I-81 corridor boundary is based upon identifying who the potential users of I-81 are, and where the potential market of users exists. The main purpose of this methodology is to determine the influence of the corridor in attracting all trip types to I-81.

3.2 Major Origins and Destinations based on City Size

Population is an important factor in determining which cities are significant enough to be included as an origin or destination within a particular region. Selection of a cut-off population size for this project was based on three criteria:

- Total number of cities within 350 miles of I-81's alignment
- Importance as an origin or destination
- Compatibility with software

The total number of cities within 350 miles above a specified population was considered because too many cities would be cumbersome and redundant in defining the corridor boundary. In the same vein, too few cities would give a sparse and incomplete picture of the corridor. Secondly, the importance of a city as an origin or destination was also analyzed because the geographic location of a particular city within a given region dictates the impact of a particular interstate highway. As the city's distance away from the interstate decreases, the impact of that interstate on travel through that city should increase. Finally, compatibility with the software, AUTOMAP for Windows Version 1.10.02, (NextBase Ltd., 1992) was also an influence when determining what the cutoff point for city size would be. Taking these three criteria into account, a city population of 50,000 using 1990 census data was determined as the cut off point for city size.

As a result of using a population of 50,000 as the cutoff point, 129 cities were identified within a 350 mile distance from I-81. There were enough cities present to effectively mark the corridor's boundary without being redundant. In addition, a population size of 50,000 is commonly used in planning applications. Finally, the software AUTOMAP could handle 50,000 as an effective cutoff point because that population is within its design standards and was very helpful in identifying key origins and destinations within the region.

3.3 Shortest Path Criteria

Shortest path criteria was used to predict which route users would choose to travel from their origins to specified destinations. In general, the shortest path is determined by the shortest time distance and not the shortest distance. For this study, the shortest time distance was used to satisfy the shortest path criteria. Since the distance of 350 miles (determined in Section 2.4) was a major factor for deciding whether air or auto was used for a particular trip, the quickest time may not be the shortest distance. Therefore, an arbitrary 5% increase in the distance cutoff point criteria was included to create a more accurate corridor boundary. This is due to the fact that distances between cities of populations over 50,000 are significant (over 100 miles on average) and if a particular city was excluded from the corridor because it was barely over 350 miles, then the corridor boundary could change by over 100 miles. The cutoff point with the 5% increase is 368 miles. It should be noted that AUTOMAP uses the given speed limits on a particular roadway to determine the shortest time path, and it does not allow for temporal and spatial variations in calculating this path.

3.4 Illustration of Methodology

The flow chart in Figure 3.1 depicts the general process which was completed for each O-D pair that was considered in this study. For illustrative purposes, an example using the cities of Roanoke, Virginia, (City A) and Washington, D.C., (City B) will be used. The 1990 population of Roanoke, Virginia, was 100,220 and was 638,333 for Washington, D.C., using AUTOMAP's population information. Roanoke is located on the I-81 alignment and Washington, D.C. is approximately 65 miles away from I-81, so both Roanoke and Washington are less than 350 miles away from I-81 using straight line distances to I-81. The shortest time distance was then calculated by AUTOMAP and a quickest route was drawn as shown in Figure 3.2. Since I-81 was used in the quickest route, and since the total distance was less than 368 miles, both cities would be included within the I-81 corridor.

3.5 Considerations for Truck Travel on I-81

Trucks compose a significant portion of the traffic stream. In 1992, the corridor averaged approximately 8,150 trucks per day in Virginia, or 25% of the total average traffic flow. This truck percentage fluctuates throughout the corridor, generally ranging from 22% to 30% daily (VDOT). The weekends register higher truck volumes northbound and the mid-week registers higher volumes southbound. One section in Virginia registered a truck percentage as high as 37%. While the percentage of trucks varies over the length of I-81, the total number of trucks does not change significantly throughout the year (depicted in Figure 3.3). Considering that trucks have passenger car equivalents ranging from 1.5 to 6.0, (Transportation Research Board, 1994) the total traffic volume in terms of passenger cars is even higher.

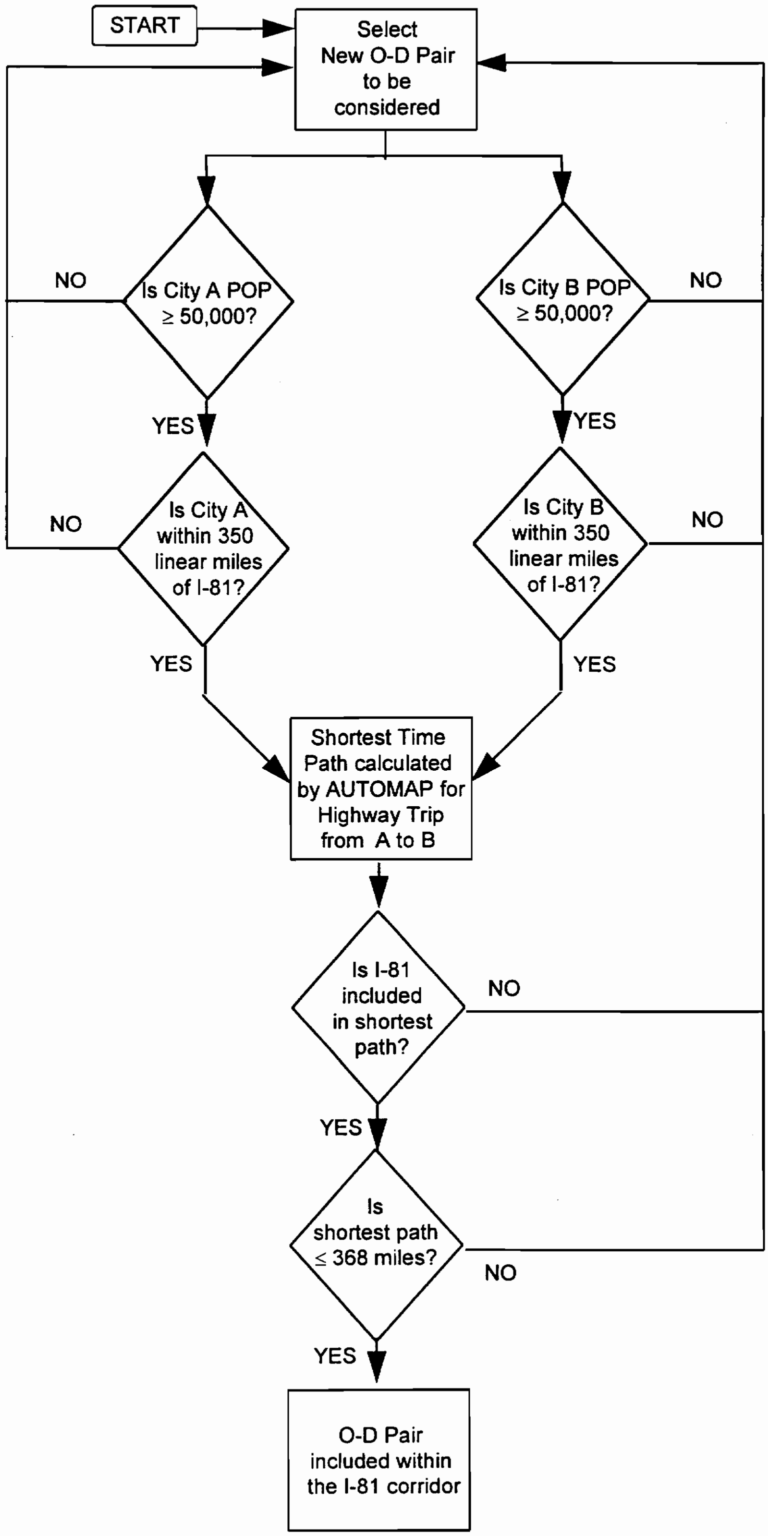

Figure 3.1: I-81 Corridor Definition Methodology

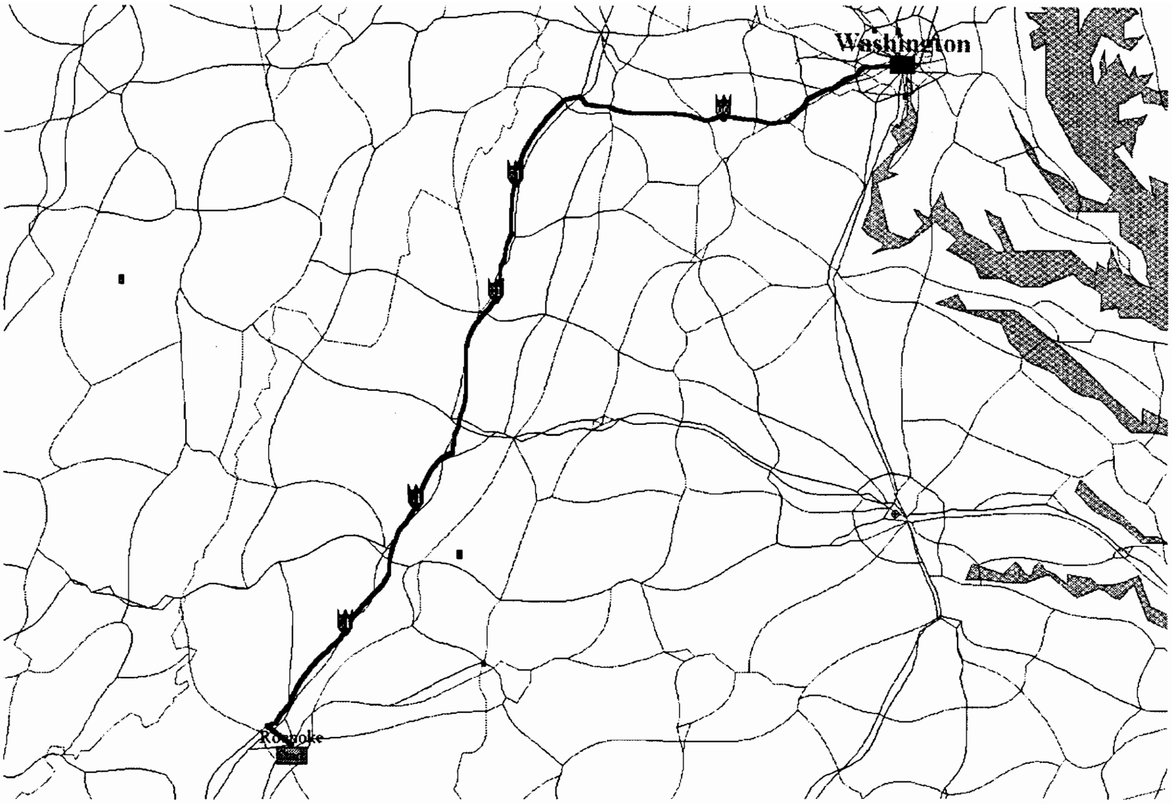

Figure 3.2: Shortest Time Path: Roanoke, VA to Washington, D.C.
(AUTOMAP software used to generate map)

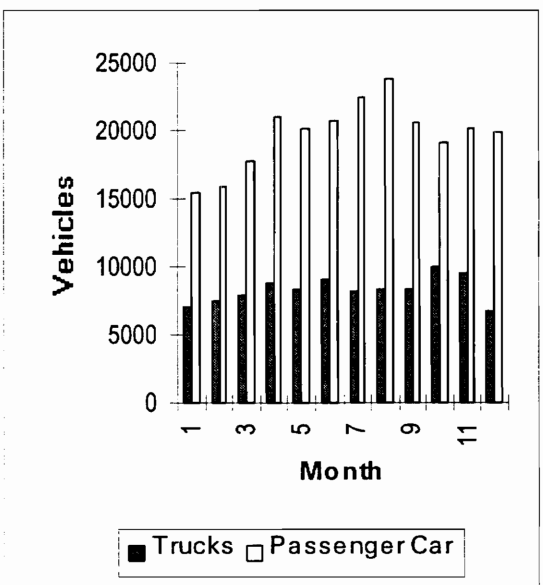

Figure 3.3: 1992 Monthly Truck Volume on I-81 - Montgomery County, VA
(Source: VDOT)

Since trucks compose a significant portion of the traffic stream, it was deemed necessary that the corridor boundary created using the aforementioned methodology should be verified by examining truck origins and destinations using I-81. The weigh station in Stephens City, Virginia, is located approximately at the halfway point of I-81's entire length and provides an excellent location to determine and possibly verify the I-81 corridor boundary for truck travel. At the Stephens City weigh station, origin-destination data is collected for every truck that violates certain regulations set forth by the Commonwealth of Virginia. From 5/94 to 4/95, 10,154 truckers (or 3% of the trucks weighed) were given citations and their origins and destinations were documented. In March of 1996, VDOT's maintenance division began to computerize all of their violation records (beginning with January 1995) and are currently keypunching all of the weigh station records for every weigh station in Virginia (VDOT, 1996). The effects of the 'violator-only' origin - destination data are not known. Since it is the only accessible information at the time of this report, it is assumed to represent the whole trucking population along I-81. The results of this data are discussed in Section 4.3.

3.6 Summary

The I-81 corridor definition used the aforementioned criteria discussed in Section 2.4 and Sections 3.2 through 3.6. The criteria for a major origin or destination to be included in the corridor is based upon three parameters:

- The city has to be over 50,000 in population

- The origin - destination pair must be within the shortest path distance of 368 miles (5% over 350 miles)
- The O-D pair must use I-81 for a portion of its trip

The proposed methodology's goal is to define the potential market of users of I-81. Since trucks comprise 22 to 30% of the total traffic stream within Virginia's section of I-81, it is also important to verify the corridor boundary defined by the proposed methodology for trucks.

4.0 Study Findings

4.1 Introduction

In Sections 4.2 through 4.4, the findings of this study will be presented. The corridor boundary definition for automobiles (based on traveler modal choice) will be defined in Section 4.2, and the truck origin - destination data presented in Section 4.3 will verify this boundary for trucks based on data gathered from a weigh station located at the midpoint of I-81's entire length. Finally, a national study completed by Argonne National Laboratory will be presented in Section 4.4 to identify the possible shortest time paths of origin-destination pairs beyond the corridor's boundary definition.

4.2 I-81 Corridor Boundary

Using the Intelligent Road Atlas software AUTOMAP Version 1.10.02 (NextBase Ltd., 1992), the cities which had a population of over 50,000 and were within 350 miles of I-81 were identified. 129 cities were within 350 miles and were identified by straight line distances or using an 'as the crow flies' distance. AUTOMAP has several features which were advantageous to the completion of this project. The following features were some of the major applications used and, as a result, the time savings when compared to completing the calculations by hand was substantial:

- The shortest time path was determined by AUTOMAP using major roads and specified speed limits
- The population size hierarchy provided within AUTOMAP could easily determine which cities were greater than 50,000 people

- The geographic locator of places gave the location of origins and destinations
- The straight line distance icon gave an accurate measure of which cities were initially included within the corridor definition study
- The print features and zoom capabilities of AUTOMAP allowed for accurate pictures to be included within this report

After identifying all of the cities over 50,000 that were within 350 miles of I-81, the shortest time distance was determined using all the identified cities along I-81 and to the west of I-81 as origins and the other cities to the east as destinations. The origins and destinations were set up in this manner for convenience purposes because only 15% of the cities were to the west or along I-81 and it was faster to generate an O-D matrix as less repetitions of the same O-D data were made. If a particular origin-destination pair used I-81 and the length of the trip was less than 368 miles (5% increase over 350 miles), then it was included within the corridor definition. Figure 4.1 gives a picture of what the I-81 corridor looks like using the aforementioned criteria with major turning points. This boundary includes 97 cities over 50,000 in population, and is expected to represent 85% of all the automobile trips within this region. This 85% is based upon the nationwide statistics previously discussed in Section 2.4.2 (BTS,1994). It is assumed that all the trips between cities included within this corridor definition use I-81 for a portion of their trip to travel to at least one city less than 368 miles away.

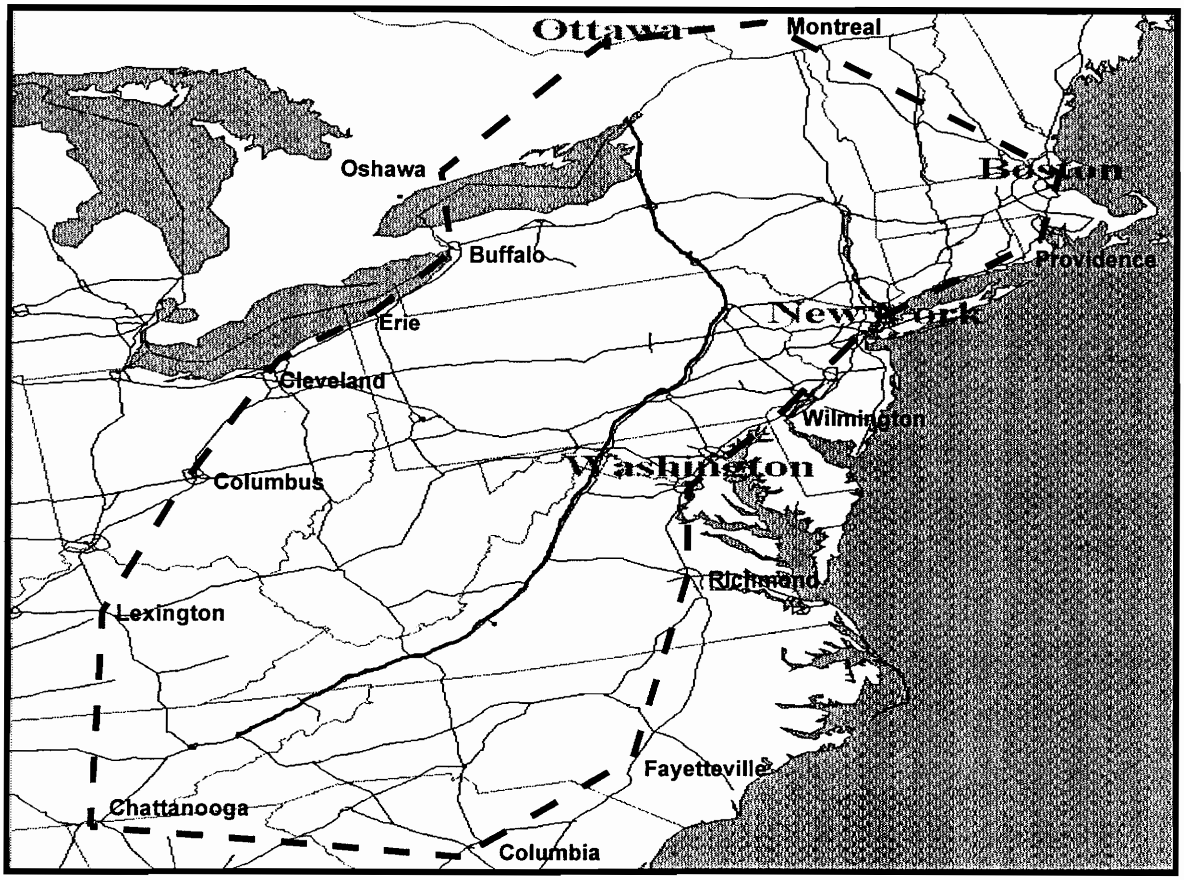

Figure 4.1: I-81 Corridor Boundary for cities over 50,000
(AUTOMAP software used to generate map)

4.3 Truck Weigh Station Origin-Destination Data

For this project, the weigh station data at Stephens City, Virginia, from January 1, 1995, to June 8, 1995, were used to find the percentage of truck origins or destinations that were within the I-81 corridor boundary definition. The effects of the 'violator-only' origin - destination data are not known. Since it is the only accessible information at the time of this report, it is assumed to represent the whole trucking population along I-81. With this in mind, 2,040 usable origin-destination pairs were analyzed to see if they were within the defined corridor. 78% of the origins and destinations analyzed were within the defined corridor and can be seen in Table 4.1. Figure 4.2 presents the percentages of origins and destinations by state for violators at the Stephens City weigh station. Virginia and Pennsylvania comprised 38% of the total number of origins and destinations. Texas and Canada both had 3% of the total origins and destinations combined.

In 1995, a separate trucking survey was completed by the Center for Transportation Research to identify trucking issues on I-81. This survey interviewed a total of fifty truckers between two rest areas located on I-81. Up to 88% of surveyed origins and destinations could be within the corridor boundary definition, however only the state (and not the specific city) was identified in this study. and some of the states are split geographically by the corridor boundary definition.

Table 4.1: Violating Truck Origins and Destinations using I-81
(Source: VDOT's Stephens City Weigh Station Data for 1/1/95-6/8/95)

State	Within I-81 Corridor		Outside Corridor		Not Known		Total	Percent of Total
	Origin	Destination	Origin	Destination	Origin	Destination		
Tennessee	56	127	9	43	0	5	240	5.55%
South Carolina	26	56	5	2	2	11	102	2.36%
North Carolina	97	262	11	8	5	1	384	8.88%
Virginia	306	459	20	12	6	7	810	18.72%
West Virginia	28	26	0	0	0	0	54	1.25%
Kentucky	5	4	3	7	1	2	22	0.51%
Ohio	19	6	6	6	0	1	38	0.88%
Maryland	50	60	0	0	2	0	112	2.59%
Pennsylvania	569	269	0	0	0	0	838	19.37%
Delaware	6	0	1	1	0	0	8	0.18%
New Jersey	174	53	1	0	8	6	242	5.59%
New York	208	97	0	0	0	0	305	7.05%
Connecticut	38	21	0	0	0	0	59	1.36%
Rhode Island	6	10	0	0	0	0	16	0.37%
Massachusetts	50	41	0	0	0	0	91	2.10%
New Hampshire	9	2	5	1	0	0	17	0.39%
Vermont	7	1	1	0	0	1	10	0.23%
Canada	28	13	43	19	38	6	147	3.40%
Unknown	0	0	0	0	69	76	145	3.35%
Oklahoma			2	6			8	0.18%
Nebraska			1	0			1	0.02%
Georgia			46	122			168	3.88%
Arkansas			15	20			35	0.81%
Missouri			3	3			6	0.14%
Maine			28	9			37	0.86%
Texas			41	94			135	3.12%
Mississippi			11	19			30	0.69%
Alabama			22	53			75	1.73%
Florida			14	39			53	1.23%
Louisiana			14	16			30	0.69%
Minnesota			0	1			1	0.02%
Wisconsin			1	2			3	0.07%
Indiana			1	2			3	0.07%
Illinois			3	6			9	0.21%
Iowa			0	3			3	0.07%
California			19	39			58	1.34%
Washington			2	1			3	0.07%
Michigan			11	3			14	0.32%
Nevada			0	2			2	0.05%
New Mexico			0	2			2	0.05%
Arizona			3	7			10	0.23%
Total	**1682**	**1507**	**342**	**548**	**131**	**116**	**4326**	100.00%
Percent of Total	**38.88%**	**34.84%**	**7.91%**	**12.67%**	**3.03%**	**2.68%**	**100%**	

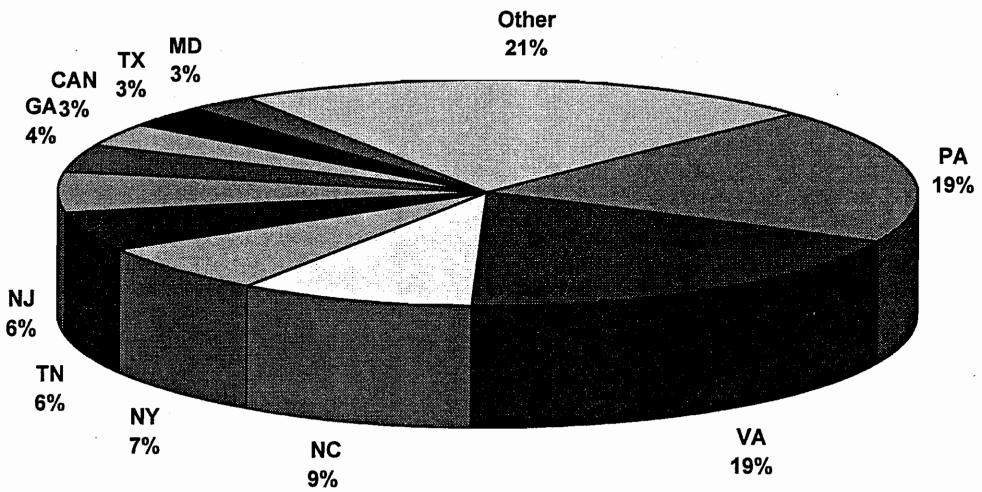

Figure 4.2: Violating Truck Origins and Destinations using I-81
(Source: VDOT's Stephens City Weigh Station 1/1/95-6/8/95)

With 78% of the truck origins or destinations and 85% of the automobile trips existing within the corridor defined by the proposed methodology, this corridor boundary is a good definition of the potential market of users traveling on I-81. Section 4.4 will identify where travel occurs outside this boundary using a national study completed by Argonne National Laboratory.

4.4 O-D pairs outside the I-81 Corridor Boundary

The corridor defined by the proposed methodology is assumed to account for 85% of all automobile trips and approximately 78% of all truck origins and destinations. The next logical step is to discuss what happens outside the corridor boundary. Therefore, an attempt has been made to analyze which O-D pairs throughout the United States would be expected to use I-81. Based on the above assumptions, approximately 15% of all automobile trips and approximately 22% of all truck trips who use I-81 are expected to have an origin or destination outside the defined corridor boundary according to the proposed methodology.

Using a nationwide origin-destination study completed by Argonne National Laboratories (1993), 597 origin-destination pairs were identified as using I-81 in their shortest time paths. Argonne estimated the number of highway person trips in 1988 for 78 cities and created a 78 x 78 O-D matrix to determine the feasibility of implementing maglev systems. This data is assumed to not be biased towards any particular mode and was used in conjunction with the AUTOMAP software package to determine whether Interstate 81 was included in the shortest time path. The number of estimated highway person trips could then be determined for those using I-81. As a result, 10,234,000 person trips were estimated to use I-81 in 1988. This is approximately 3.2% of the total number of trips estimated nationwide (See Table A-5 and A-6 in the Appendix for a summary and complete listing of these O-D pairs). I-81's 850 miles composes 2% of the entire length of the interstate system. Of the 78 cities in the study, 57 cities (or 73%) were outside the defined corridor boundary. These cities accounted for 20% of the highway trips with 2,070,000 person trips having an origin or destination outside the corridor boundary. Figures 4.3 through 4.9 show many of the O-D pairs expected to use I-81 with major cities such as New York, Boston, Washington D.C., Miami, Houston, Texas, Chicago, and Los Angeles.

Figure 4.3 shows the O-D pairs between which trips are expected to use I-81 to get to or from New York City. A total of 2,341,000 person trips were expected to used I-81 in 1988 to access or leave New York City. It appears that I-80 captures most of the traffic north of the Phoenix - Albuquerque - Kansas City Line. I-95 captures most of the traffic in the eastern halves of Virginia, North Carolina, South Carolina, Georgia and most of Florida.

Figure 4.4 displays the O-D pairs between which travelers to or from Boston, Massachusetts, are expected to use I-81. A total of 417,000 person trips were expected to use I-81 in 1988 to connect with Boston. Most of the 78 cities accessing Boston using some portion of I-81; however, cities to the north and immediately to the west, such as Syracuse, use other interstates to access Boston.

Figure 4.5 depicts the O-D pairs between which trips are expected to use I-81 to get to or from Washington D.C. As a result, a total of 139,000 person trips were expected to use I-81 in 1988 to access or leave Washington, D.C. It appears that I-70 to the west and I-95 to the north and south capture most of the person trips traveling to the nation's capital; however, cities as far as Tucson, Arizona are expected to use I-81 to visit Washington D.C.

Figure 4.6 shows the O-D pairs between which travelers to or from Atlanta, Georgia are expected to use I-81. In 1988, 198,000 person trips were expected to use I-81 to connect with Atlanta. It appears that most of West Virginia and Virginia, and all of the states north of Pennsylvania, use I-81 when traveling to Atlanta.

Figure 4.7 presents the O-D pairs between which trips are expected to use I-81 to get to or from four cities in Florida: Miami, Tampa, Orlando, and Jacksonville. As a result, a total of 620,000 person trips were expected to use some portion of I-81 in 1988 to access or leave these four Florida cities. It appears that I-81 is the main connection between Eastern Ohio, Ontario, Canada, Western Pennsylvania and these four cities.

Figure 4.8 depicts the O-D pairs between which travelers are expected to use I-81 to travel to or from Dallas and Houston, Texas. In 1988, 246,000 person trips were expected to use I-81 to access or leave these two Texas cities. It appears that I-81 is the main connection between several key Northeast cities and Dallas and Houston.

Figure 4.9 shows the O-D pairs between Los Angeles and other cities where travelers are expected to use I-81. Only 34,000 person trips were expected in 1988 to use some portion of I-81 to access or leave Los Angeles. It appears that I-81's role on this cross country trip is quite limited.

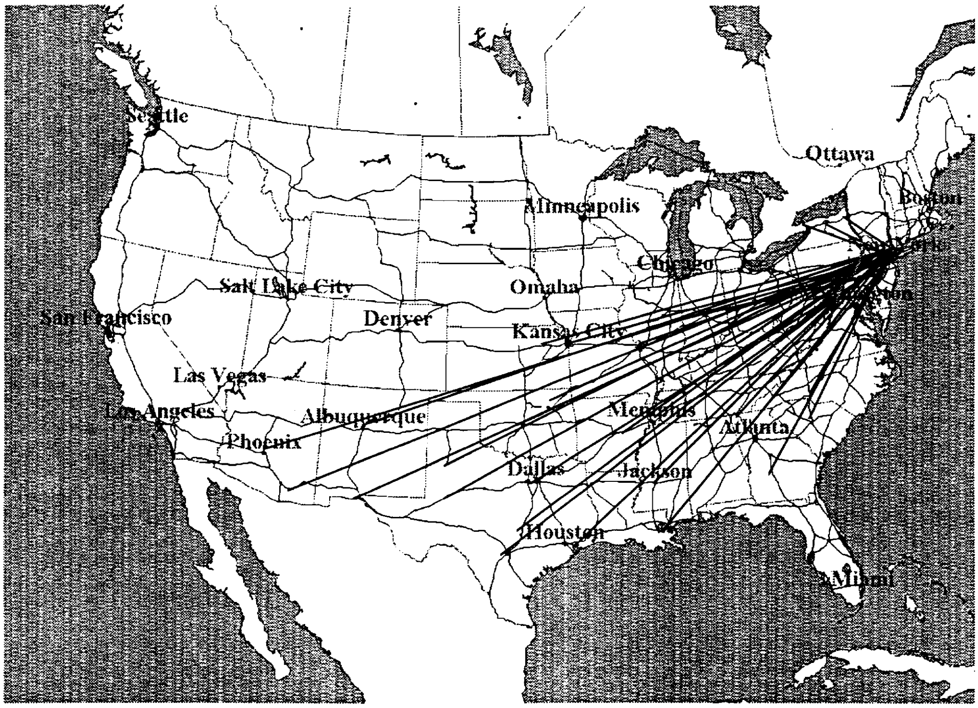

Figure 4.3: New York O-D Pairs expected to use a portion of I-81

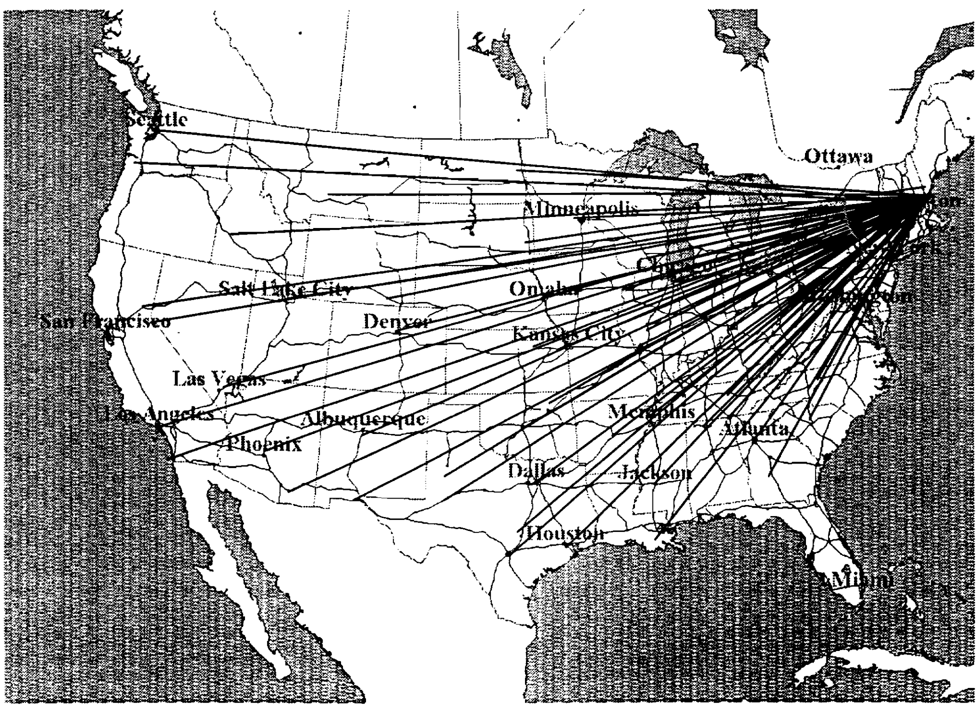

Figure 4.4: Boston O-D Pairs expected to use a portion of I-81

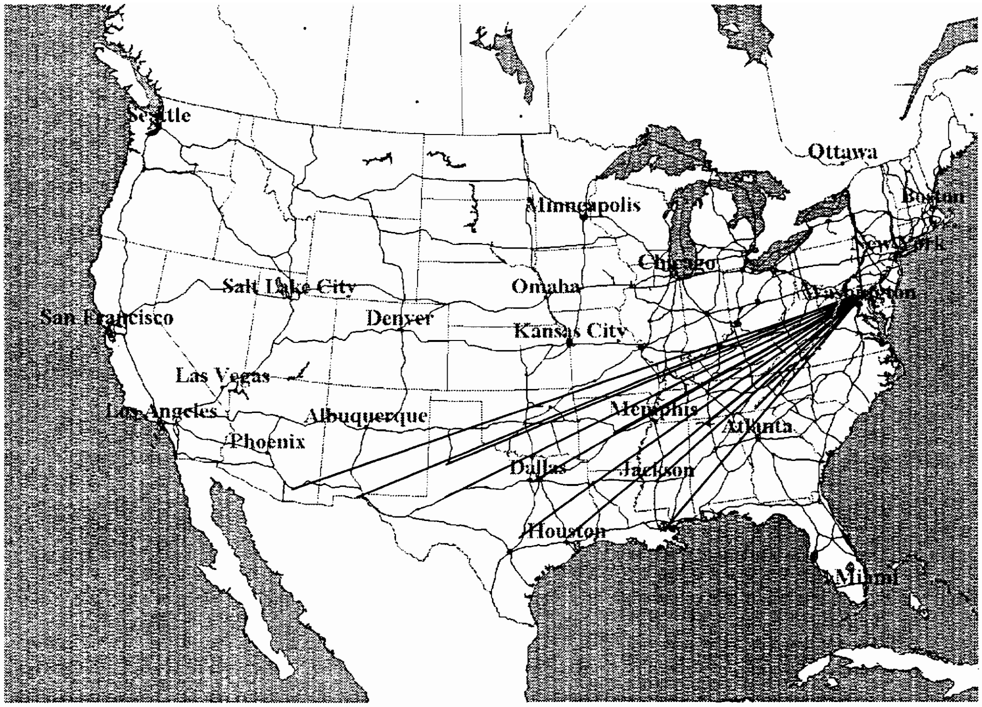

Figure 4.5: Washington DC O-D Pairs expected to use a portion of I-81

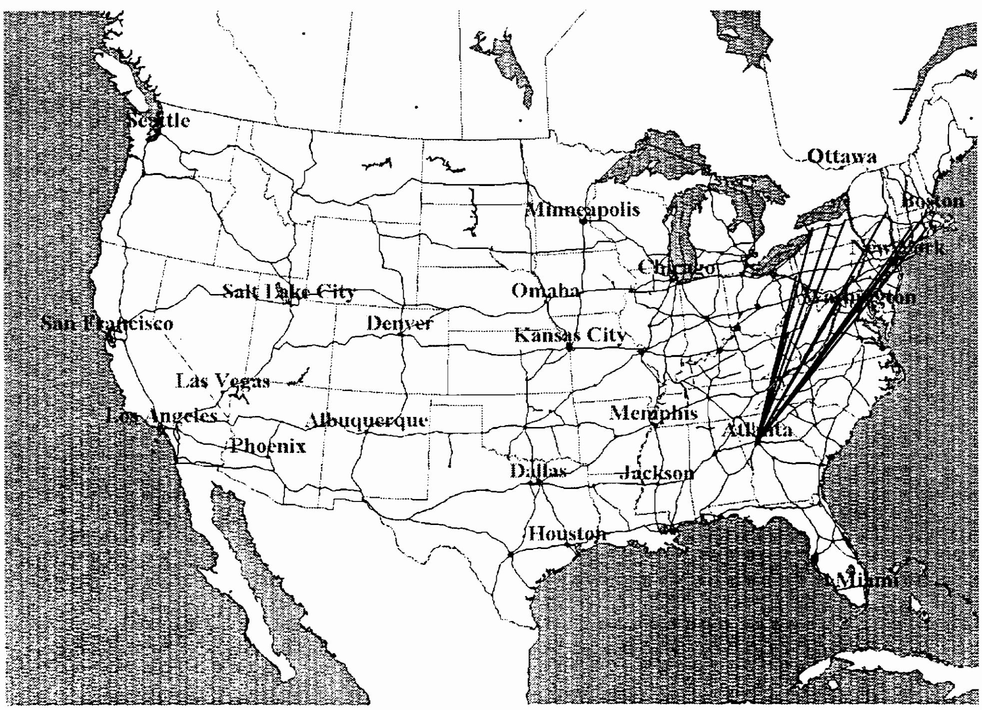

Figure 4.6: Atlanta O-D Pairs expected to use a portion of I-81

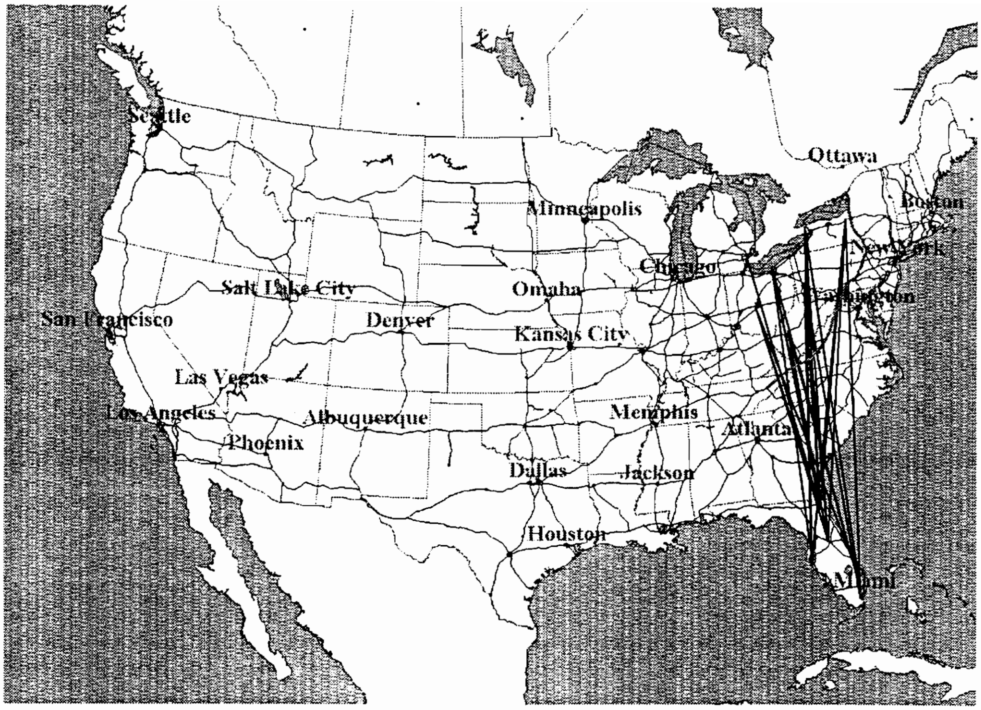

Figure 4.7: Florida O-D Pairs expected to use a portion of I-81

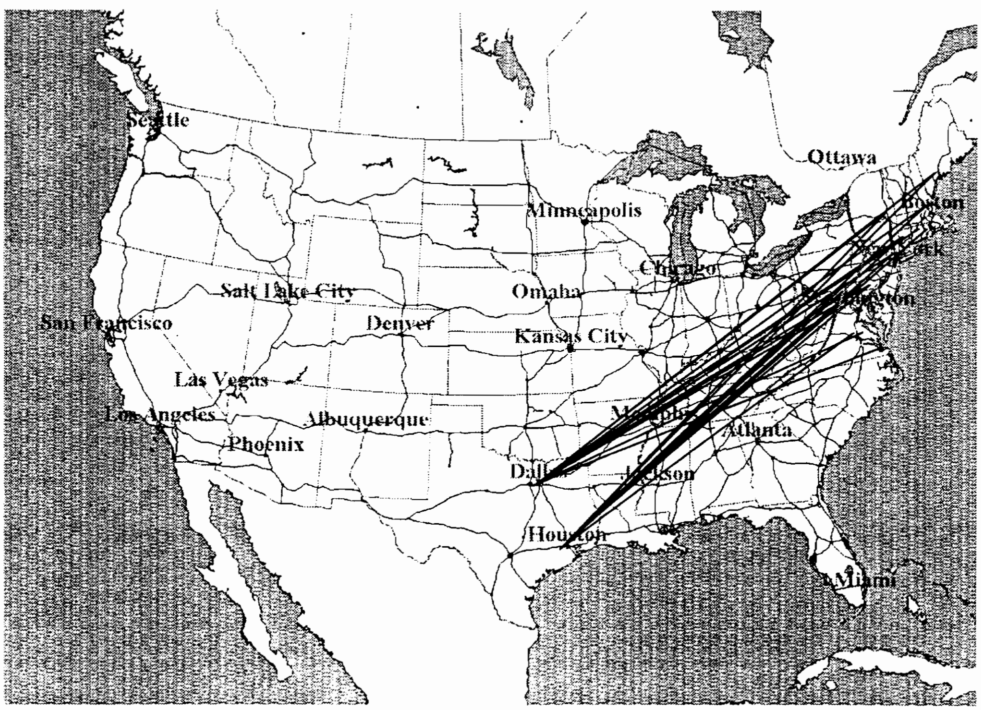

Figure 4.8: Dallas and Houston O-D Pairs expected to use a portion of I-81

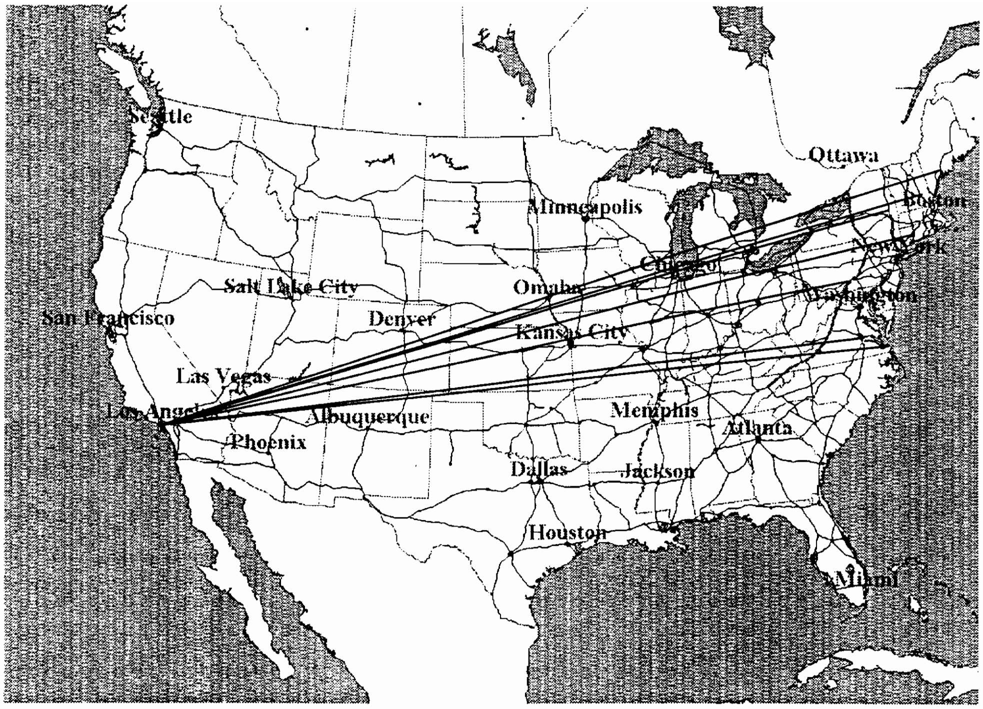

Figure 4.9: Los Angeles O-D Pairs expected to use a portion of I-81

4.5 Summary

In conclusion, the I-81 corridor boundary definition was determined using shortest time path and macroscopic traveler modal choice criteria. This boundary is expected to represent 85% of automobile travel (BTS, 1994) and 78% of truck travel. The truck origins and destinations were verified using the best available data; however, the effects of using 'violator-only' data from weigh stations are not known. The origins and destinations outside the boundary that are expected to use I-81 in its shortest time path are assumed to account for most of the remaining 15% of automobile travel and 22% of truck travel. Further discussion of the results will occur in Section 5.0

5.0 Conclusions

In today's planning applications, new partnerships and organizations have formed as a result of advancing transportation technologies developed under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Corridor coalitions have provided the necessary framework for the deployment of Intelligent Transportation Systems (ITS) on a corridor-wide basis. The new transportation bill of 1997 is projected to support this type of planning application well into the next century, and there will be a growing need to define corridor boundaries as more coalitions are formed. A methodology to set these corridor boundaries quickly with or without elaborate data collection is necessary as planners begin to analyze the needs of corridors. The proposed methodology presented in Section 3.0 fulfills the need for a preliminary definition.

The proposed methodology presented within this report used shortest path criteria and traveler modal choice to define the potential market of users for I-81. The criteria for a major origin or destination to be included in the corridor is based upon three parameters:

- City size is over 50,000 in population
- O-D pair must be within the shortest path distance of 368 miles
- The O-D pair must use I-81

Within the region defined by the corridor and based on study assumptions, 85% of the automobile travel and approximately 78% of the truck travel have an origin or destination within the corridor boundary (See Figure 5.1).

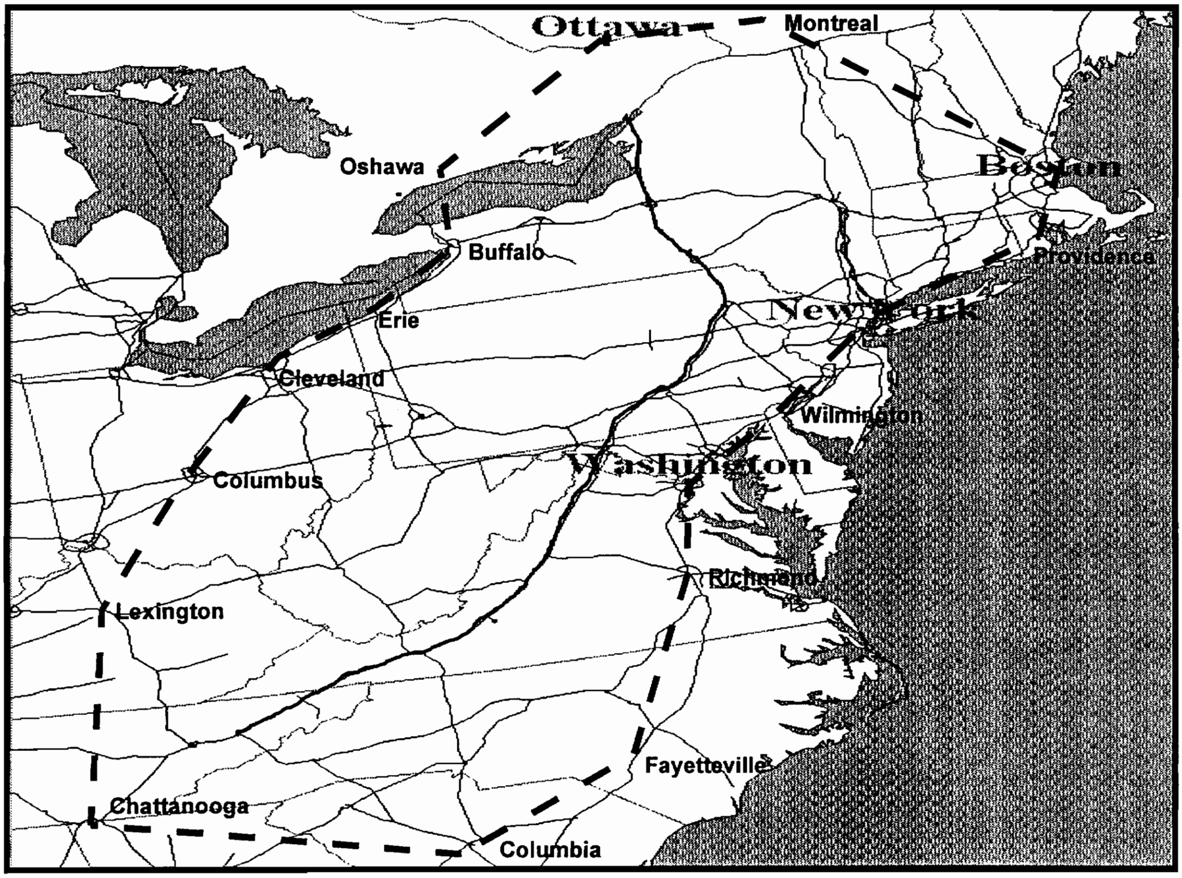

Figure 5.1: I-81 Corridor Boundary for cities over 50,000
(AUTOMAP software used to generate map)

The proposed methodology has several strengths. The corridor definition presented is a practical and easily generated boundary that depicts the potential market of interstate highway users. Planners want to define their study area as quickly and as accurately as possible so that other planning applications can begin. The corridor boundary definition presented here expedites the definition process. In addition, this boundary definition is very flexible as it can be applied to any particular city, group of cities, or roadways to determine what other cities interact within a 350 mile region, and what shortest time paths are used. The major weaknesses of the corridor definition arise when discussing the validity of the results. Since no previous methodology exists for this type of boundary definition, it is very difficult to base any of this report's results on what has been completed in the past. The only way to validate this kind of study is through the use of origin-destination data. Currently, there are no data sources known to validate this kind of study. The truck origin-destination data received from the Stephens City, Virginia, weigh station may be skewed since it is based on a sample of all the truckers that violated regulations and received citations.

Validation of the corridor boundary is one particular area that needs further research. Gathering origin-destination data should be an integral part of the validating process. Secondly, it is important to realize that this is only one type of corridor boundary definition. Research using the graph theory principles and accessibility models discussed in the literature review may be analyzed further to possibly create another type of border where the interstate system is compared to the drainage system which Haggett suggested (1969). Another method could be formed based on traffic flow characteristics and supply-demand relationships.

The I-81 corridor boundary definition based on traveler choice is a quick and easy methodology to define corridors such as I-81. It uses the shortest time paths and a cutoff distance of 368 miles (5% greater than 350 miles). Based on study assumptions, 85% of automobile travel and approximately 78% of truck travel have an origin or destination within this boundary. Based on Argonne National Laboratories data (1993), 3.2% of all person trips made in 1988 can be expected to use I-81 in their shortest time paths. In general, this boundary definition seems logical and appropriate; however, future research and validation of this boundary definition needs to be performed before this definition can be fully accepted.

6.0 References

Bureau of Transportation Statistics (BTS). *Transportation Statistics Annual Report 1994.* Washington, D.C., 1994.

Center for Transportation Research (CTR). *The I-81 Corridor in Virginia: Transportation Issues and ITS Opportunities.* Blacksburg, VA, March 1996.

Haggett, P. and Chorley, R.J. *Network Analysis in Geography.* Great Britain, 1969.

I-81 Corridor Coalition. *A Proposal for Strategically Developing the Interstate 81 Corridor Region.* June 1990.

I-81 Corridor Coalition. *I-81 Interchange Study.* 1992.

I-95 Corridor Coalition. *Business Plan.* 1995.

Jones, S.B. *Boundary-Making A Handbook for Statesmen, Treaty Editors, and Boundary Commissioners.* Concord, NH, 1945.

Lowe, J.C. and Moryadas, S. *The Geography of Movement.* Boston, 1975.

Transportation Research Board (TRB). *Highway Capacity Manual Special Report 209.* Washington, D.C. 1994.

Virginia Department of Transportation (VDOT). *Stephens City Weigh Station Truck O-D Data.* 1995.

Virginia Department of Transportation (VDOT). *Monthly Truck Volumes.* 1992.

Virginia Department of Transportation (VDOT). *Construction District Map.* 1996.

Vyas, A.D. and Rote, D.M. *Market and Demand Analysis of a U.S. Maglev System.* Maglev 1993 Conference. Argonne, IL, 1993.

Appendix

Table A-1: Cities over 50,000 within I-81's North Corridor

		Syracuse			Binghamton			Scranton			Harrisburg			Wilkes Barre			Rochester			Altoona			Pittsburgh			Buffalo			Total
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Syracuse	NY	0	N	0	80	Y	1	131	Y	1	246	Y	1	148	Y	1	88	N	0	269	Y	1	373	N	0	163	N	0	5
Binghamton	NY	80	Y	1	0	N	0	59	Y	1	175	Y	1	77	Y	1	142	N	0	229	N	0	336	N	0	205	N	0	4
Scranton	PA	131	Y	1	59	Y	1	0	N	0	116	Y	1	18	N	0	201	Y	1	184	Y	1	291	Y	1	246	N	0	6
Harrisburg	PA	246	Y	1	175	Y	1	116	Y	1	0	N	0	116	Y	1	260	N	0	129	N	0	212	Y	1	300	N	0	5
Wilkes Barre	PA	148	Y	1	77	Y	1	18	N	0	101	Y	1	0	N	0	202	N	0	166	N	0	273	N	0	247	N	0	3
Rochester	NY	88	N	0	142	N	0	201	Y	1	260	N	0	202	N	0	0	N	0	260	N	0	291	N	0	81	N	0	1
Altoona	PA	269	Y	1	229	N	0	184	Y	1	129	N	0	166	N	0	260	N	0	0	N	0	101	N	0	220	N	0	2
Pittsburgh	PA	373	N	0	336	N	0	291	Y	1	212	Y	1	273	N	0	292	N	0	101	N	0	0	N	0	220	N	0	2
Buffalo	NY	163	N	0	205	N	0	246	N	0	300	N	0	247	N	0	81	N	0	220	N	0	220	N	0	0	N	0	0
Erie	PA	255	N	0	275	N	0	308	Y	1	269	N	0	291	N	0	173	N	0	181	N	0	123	N	0	101	N	0	1
Albany	NY	154	N	0	135	Y	1	176	Y	1	280	Y	1	193	Y	1	238	N	0	356	Y	1	461	Y	0	313	N	0	5
Schenectady	NY	139	N	0	128	Y	1	179	Y	1	294	Y	1	196	Y	1	224	N	0	349	Y	1	456	Y	0	298	N	0	5
Troy	NY	154	N	0	143	Y	1	184	Y	1	288	Y	1	201	Y	1	238	N	0	364	Y	1	471	Y	0	313	N	0	5
Utica	NY	56	N	0	97	Y	1	148	Y	1	263	Y	1	165	Y	1	141	N	0	318	Y	1	429	N	0	215	N	0	5
Pittsfield	MA	196	N	0	178	Y	1	192	Y	1	296	Y	1	209	Y	1	280	N	0	374	Y	0	482	Y	0	355	N	0	4
Springfield	MA	243	N	0	225	Y	1	213	Y	1	311	Y	1	230	Y	1	328	N	0	396	Y	0	503	Y	0	402	N	0	4
Chicopee	MA	240	N	0	221	Y	1	212	Y	1	316	Y	1	230	Y	1	324	N	0	395	Y	0	502	Y	0	399	N	0	4
Worchester	MA	291	N	0	273	Y	1	250	Y	1	348	Y	1	267	Y	1	375	N	0	432	Y	0	539	Y	0	450	N	0	4
Framingham	MA	308	N	0	290	Y	1	267	Y	1	365	Y	1	284	Y	1	392	N	0	449	Y	0	556	Y	0	467	N	0	4
Boston	MA	321	N	0	315	Y	1	292	Y	1	390	Y	0	310	Y	1	405	N	0	475	Y	0	582	Y	0	480	N	0	3
Newton	MA	324	N	0	307	Y	1	283	Y	1	381	Y	0	300	Y	1	408	N	0	465	Y	0	572	Y	0	483	N	0	3
Quincy	MA	340	N	0	321	Y	1	299	Y	1	393	Y	0	316	Y	1	425	N	0	481	Y	0	588	Y	0	499	N	0	3
Brockton	MA	347	N	0	315	Y	1	305	Y	1	390	Y	0	322	Y	1	431	N	0	488	N	0	595	N	0	506	N	0	3
Lynn	MA	331	N	0	328	Y	1	300	Y	1	403	Y	0	322	Y	1	415	N	0	487	Y	0	594	Y	0	490	N	0	3
Weymouth	MA	340	N	0	322	Y	1	297	Y	1	392	Y	0	316	Y	1	424	N	0	481	Y	0	588	Y	0	499	N	0	3
Lowell	MA	306	N	0	295	Y	1	291	Y	1	389	Y	0	308	Y	1	391	N	0	473	Y	0	580	Y	0	465	N	0	3
Lawerence	MA	317	N	0	306	Y	1	302	Y	1	400	Y	0	319	Y	1	402	N	0	484	Y	0	591	Y	0	476	N	0	3
Fall River	MA	350	N	0	321	N	0	280	Y	1	368	Y	0	297	Y	1	434	N	0	465	N	0	572	N	0	509	N	0	2
Nashua	NH	291	N	0	280	Y	1	303	Y	1	401	Y	0	320	Y	1	375	N	0	485	Y	0	592	Y	0	450	N	0	3
Manchester	NH	300	N	0	289	Y	1	315	Y	1	413	Y	0	332	Y	1	384	N	0	497	Y	0	604	Y	0	459	N	0	3
Pawtucket	RI	328	N	0	306	N	0	265	Y	1	355	Y	0	282	Y	1	413	N	0	447	Y	0	554	Y	0	487	N	0	2
Providence	RI	331	N	0	302	N	0	262	Y	1	351	Y	0	279	Y	1	416	N	0	449	N	0	556	N	0	490	N	0	2
Warwick	RI	338	N	0	300	N	0	265	Y	1	345	Y	0	276	Y	1	423	N	0	442	N	0	549	N	0	497	N	0	2
Hartford	CT	263	N	0	227	N	0	185	Y	1	289	Y	1	204	Y	1	347	N	0	369	Y	1	476	Y	0	422	N	0	4
New Britain	CT	265	N	0	216	N	0	176	Y	1	274	Y	0	193	Y	1	350	N	0	358	Y	1	465	Y	0	422	N	0	3
Bristol	CT	263	N	0	216	N	0	175	Y	1	273	Y	1	192	Y	1	347	N	0	357	Y	1	464	Y	0	422	N	0	4
Meriden	CT	279	N	0	215	N	0	175	Y	1	274	Y	1	191	Y	1	363	N	0	356	Y	1	463	Y	0	420	N	0	4
Waterbury	CT	265	N	0	201	N	0	160	Y	1	258	Y	1	177	Y	1	350	N	0	343	Y	1	450	Y	0	406	N	0	4
New Haven	CT	279	Y	1	207	N	0	167	Y	1	253	Y	1	184	Y	1	349	N	0	350	N	0	457	N	0	413	N	0	4
Danbury	CT	246	Y	1	174	N	0	133	Y	1	232	Y	1	150	Y	1	316	N	0	316	Y	1	423	Y	0	379	N	0	5
Stamford	CT	258	Y	1	187	N	0	144	Y	1	216	Y	1	163	N	0	329	N	0	313	N	0	420	N	0	392	N	0	3
Bridgeport	CT	274	Y	1	203	N	0	162	Y	1	235	Y	1	182	N	0	345	N	0	332	N	0	439	N	0	408	N	0	3
Norwalk	CT	264	Y	1	193	N	0	149	Y	1	222	Y	1	169	N	0	335	N	0	319	N	0	426	N	0	398	N	0	3
New Rochelle	NY	251	Y	1	180	N	0	133	N	0	189	Y	1	137	N	0	322	N	0	287	N	0	394	N	0	386	N	0	2
Yonkers	NY	246	Y	1	175	N	0	132	Y	1	185	Y	1	132	N	0	317	N	0	282	N	0	389	N	0	380	N	0	3
New York	NY	248	Y	1	176	Y	1	118	N	0	164	Y	1	122	N	0	319	Y	1	272	N	0	373	Y	0	365	Y	1	5
Paterson	NJ	237	Y	1	166	Y	1	108	N	0	164	Y	1	111	N	0	308	Y	1	261	N	0	368	N	0	354	Y	1	5

1 Shortest Time Path between Origin and Destination from Automap
2 Y = Uses I-81; N = Does not use I-81
3 1 = O-D Pair included in Corridor; 0 = Does not meet criteria

		Syracuse			Binghamton			Scranton			Harrisburg			Wilkes Barre			Rochester			Altoona			Pittsburgh			Buffalo			Total
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Newark	NJ	239	Y	1	168	Y	1	110	N	0	157	Y	1	114	N	0	310	Y	1	264	N	0	366	Y	1	356	Y	1	6
Union City	NJ	247	Y	1	176	Y	1	117	N	0	166	Y	1	121	N	0	317	Y	1	271	N	0	376	Y	0	363	Y	1	5
Jersey City	NJ	244	Y	1	173	Y	1	115	N	0	160	Y	1	119	N	0	315	Y	1	269	N	0	370	Y	0	361	Y	1	5
Bayonne	NJ	246	Y	1	175	Y	1	117	N	0	158	Y	1	120	N	0	317	Y	1	271	N	0	368	Y	1	363	Y	1	6
Elizabeth	NJ	245	Y	1	173	Y	1	115	N	0	157	Y	1	119	N	0	316	Y	1	269	N	0	367	Y	1	362	Y	1	6
E Orange	NJ	234	Y	1	163	Y	1	105	N	0	155	Y	1	108	N	0	305	Y	1	258	N	0	367	N	0	351	Y	1	5
Reading	PA	232	Y	1	160	Y	1	101	Y	1	57	N	0	87	Y	1	276	N	0	200	N	0	270	N	0	321	N	0	4
Allentown	PA	204	Y	1	133	Y	1	75	N	0	82	Y	1	68	N	0	275	Y	1	203	N	0	292	Y	1	315	N	0	5
Trenton	NJ	243	Y	1	172	Y	1	114	N	0	136	N	0	117	N	0	314	Y	1	275	N	0	344	N	0	360	Y	1	4
Philadelphia	PA	255	Y	1	184	Y	1	126	N	0	111	N	0	123	N	0	326	Y	1	251	N	0	320	N	0	370	N	0	3
Camden	NJ	260	Y	1	189	Y	1	131	N	0	116	N	0	128	N	0	331	Y	1	256	N	0	325	N	0	375	N	0	3
Vineland	NJ	287	Y	1	216	Y	1	158	N	0	123	N	0	157	N	0	358	Y	1	262	N	0	331	N	0	404	N	0	3
Wilmington	DE	273	Y	1	202	Y	1	143	N	0	90	N	0	133	N	0	332	N	0	229	N	0	298	N	0	377	N	0	2
Lancaster	PA	255	Y	1	183	Y	1	124	Y	1	38	N	0	110	Y	1	289	Y	1	177	N	0	246	N	0	329	Y	1	6
Towson	MD	316	Y	1	245	Y	1	186	Y	1	72	N	0	175	Y	1	332	N	0	169	N	0	238	N	0	372	N	0	4
Baltimore	MD	327	Y	1	256	Y	1	197	Y	1	79	N	0	182	Y	1	340	N	0	175	N	0	244	N	0	380	N	0	4
Columbia	MD	340	Y	1	269	Y	1	208	Y	1	92	N	0	195	Y	1	353	N	0	174	N	0	244	N	0	379	N	0	4
Silver Springs	MD	358	Y	1	287	Y	1	228	Y	1	110	N	0	213	Y	1	371	N	0	167	N	0	236	N	0	372	N	0	4
Bethesda	MD	363	Y	1	291	Y	1	232	Y	1	115	N	0	218	Y	1	370	N	0	161	N	0	230	N	0	366	N	0	4
Washington	DC	365	Y	1	294	Y	1	235	Y	1	117	N	0	220	Y	1	380	N	0	172	N	0	241	N	0	376	N	0	4
Alexandria	VA	372	Y	0	305	Y	1	243	Y	1	125	N	0	228	Y	1	386	N	0	185	N	0	254	N	0	389	N	0	3
Richmond	VA	474	Y	0	402	Y	0	343	Y	1	226	N	0	329	Y	1	481	N	0	272	N	0	341	N	0	477	N	0	2
Canton	OH	352	N	0	388	N	0	360	Y	1	306	Y	1	345	N	0													2
Akron	OH	377	N	0	369	N	0	343	Y	1	303	N	0	325	N	0													1
Warren	OH	336	N	0	333	N	0	307	Y	1	268	N	0	289	N	0													1
Youngstown	OH	346	N	0	366	N	0	299	Y	1	259	N	0	281	N	0													1
Euclid	OH	339	N	0	354	N	0	363	Y	1	324	N	0	346	N	0													1
Cleveland	OH	339	N	0	366	N	0	365	Y	1	326	N	0	348	N	0													1
Ottawa	ON	213	Y	1	292	Y	1	343	Y	1	458	Y	0	360	Y	1	277	Y	1	482	Y	0	568	Y	0	358	Y	1	6
Montreal	PQ	269	Y	1	348	Y	1	399	Y	0	514	Y	0	416	Y	0	333	Y	1	537	Y	0	624	N	0	414	Y	0	3
Oshawa	ON	272	Y	1	351	Y	1	402	Y	0	443	N	0	390	N	0	214	N	0	363	N	0	363	N	0	143	N	0	2
				37			49			58			35			44			17			12			6			11	269

1 Shortest Time Path between Origin and Destination from Automap
2 Y = Uses I-81; N = Does not use I-81
3 1 = O-D Pair included in Corridor; 0 = Does not meet criteria

Table A-2: Cities over 50,000 within I-81's Central Corridor

		Bristol VA			Roanoke VA			Winchester, VA		
		1	2	3	1	2	3	1	2	3
Huntsville	AL	331	Y	1	475	Y	0	640	N	0
Bridgeport	CT	660	Y	0	527	Y	0	348	Y	1
Danbury	CT	656	Y	0	523	Y	0	345	Y	1
New Haven	CT	678	Y	0	545	Y	0	366	Y	1
Norwalk	CT	646	Y	0	514	Y	0	335	Y	1
Stamford	CT	641	Y	0	508	Y	0	329	Y	1
Waterbury	CT	683	Y	0	551	Y	0	372	Y	0
Washington	DC	373	Y	0	240	Y	1	76	N	0
Dover	DE	473	Y	0	340	Y	1	176	N	0
Wilmington	DE	482	Y	0	349	Y	1	173	N	0
Atlanta	GA	290	N	0	422	N	0	602	Y	0
Macon	GA	344	N	0	468	N	0	648	Y	0
Frankfort	KY	257	N	0	373	Y	0	444	N	0
Lexington	KY	229	N	0	347	Y	1	419	N	0
Louisville	KY	301	N	0	417	Y	0	489	N	0
Annapolis	MD	406	Y	0	274	Y	1	110	N	0
Baltimore	MD	409	Y	0	277	Y	1	100	N	0
Bethesda	MD	372	Y	0	240	Y	1	74	N	0
Columbia	MD	393	Y	0	260	Y	1	95	N	0
Silver Springs	MD	378	Y	0	246	Y	1	80	N	0
Towson	MD	416	Y	0	283	Y	1	106	N	0
Asheville	NC	91	N	0	237	Y	1	401	Y	0
Charlotte	NC	153	N	0	184	N	0	365	Y	1
Durham	NC	223	N	0	155	N	0	281	Y	1
Fayetteville	NC	266	N	0	198	N	0	350	N	0
Greensboro	NC	171	N	0	102	N	0	281	Y	1
High Point	NC	163	N	0	120	N	0	297	Y	1
Raleigh	NC	247	N	0	179	N	0	299	N	0
Winston Salem	NC	144	N	0	109	.N	0	288	Y	1
Bayonne	NJ	583	Y	0	450	Y	0	272	Y	1
E Orange	NJ	580	Y	0	447	Y	0	268	Y	1
Elizabeth	NJ	582	Y	0	449	Y	0	270	Y	1
Jersey City	NJ	585	Y	0	452	Y	0	273	Y	1
Newark	NJ	581	Y	0	449	Y	0	270	Y	1
Paterson	NJ	589	Y	0	456	Y	0	277	Y	1
Trenton	NJ	559	Y	0	427	Y	0	248	Y	1
Union City	NJ	591	Y	0	458	Y	0	279	Y	1
Vineland	NJ	512	Y	0	379	Y	0	203	N	0
Binghampton	NY	600	Y	0	467	Y	0	288	Y	1
Buffalo	NY	590	Y	0	529	Y	0	341	N	0
New Rochelle	NY	614	Y	0	482	Y	0	303	Y	1
New York	NY	589	Y	0	456	Y	0	277	Y	1
Niagra Falls	NY	608	Y	0	547	Y	0	359	N	0
Rochester	NY	661	Y	0	540	Y	0	361	Y	1

1 Shortest Time Path between Origin and Destination from Automap (Miles)
2 Y = Uses I-81; N = Does not use I-81
3 1 = O-D pair included in the Corridor; 0 = Does not meet criteria

		Bristol VA			Roanoke VA			Winchester, VA		
		1	2	3	1	2	3	1	2	3
Syracuse	NY	671	Y	0	538	Y	0	359	Y	1
Yonkers	NY	610	Y	0	477	Y	0	298	Y	1
Akron	OH	406	Y	0	385	Y	0	300	N	0
Canton	OH	384	Y	0	363	Y	1	265	N	0
Cincinnati	OH	313	N	0	378	Y	0	422	N	0
Cleveland	OH	444	Y	0	423	Y	0	327	N	0
Columbus	OH	341	Y	1	344	Y	1	321	N	0
Dayton	OH	361	N	0	378	Y	0	393	N	0
Elyria	OH	456	Y	0	434	Y	0	344	N	0
Euclid	OH	454	Y	0	433	Y	0	329	N	0
Lorain	OH	457	Y	0	435	Y	0	345	N	0
Mansfield	OH	414	Y	0	392	Y	0	321	N	0
Springfield	OH	367	Y	1	385	Y	0	367	N	0
Warren	OH	449	Y	0	383	Y	0	274	N	0
Youngstown	OH	428	Y	0	367	Y	1	258	N	0
Allentown	PA	507	Y	0	374	Y	0	196	Y	1
Altoona	PA	434	Y	0	301	Y	1	122	N	0
Erie	PA	492	Y	0	431	Y	0	311	N	0
Harrisburg	PA	427	Y	0	294	Y	1	116	Y	1
Lancaster	PA	461	Y	0	329	Y	1	150	Y	1
Philadelphia	PA	512	Y	0	379	Y	0	203	N	0
Pittsburgh	PA	371	Y	0	310	Y	1	180	N	0
Reading	PA	485	Y	0	352	Y	1	173	Y	1
Scranton	PA	541	Y	0	408	Y	0	229	Y	1
Wilkes Barre	PA	526	Y	0	393	Y	0	215	Y	1
Charleston	SC	355	N	0	380	N	0	565	N	0
Columbia	SC	246	N	0	276	N	0	457	Y	0
Greenville	SC	155	N	0	278	N	0	458	Y	0
Chattanooga	TN	224	Y	1	368	Y	1	533	Y	0
Clarksville	TN	338	Y	1	482	Y	0	647	Y	0
Knoxville	TN	114	Y	1	258	Y	1	423	Y	0
Nashville	TN	291	Y	1	435	Y	0	600	Y	0
Alexandria	VA	372	Y	0	239	Y	1	75	N	0
Hampton	VA	396	Y	0	243	N	0	209	N	0
Lynchburg	VA	197	Y	0	53	N	0	164	Y	1
Newport News	VA	399	Y	0	245	N	0	212	N	1
Norfolk	VA	414	Y	0	249	N	0	227	N	1
Richmond	VA	316	Y	1	167	N	0	138	N	1
Roanoke	VA	147	Y	1		N	0	179	Y	1
Virginia Beach	VA	426	Y	0	273	N	0	239	N	0
Charleston	WV	197	Y	1	176	Y	1	248	N	0
Huntington	WV	207	Y	1	226	Y	1	298	N	0
				11			24			35

1 Shortest Time Path between Origin and Destination from Automap (Miles)
2 Y = Uses I-81; N = Does not use I-81
3 1 = O-D pair included in the Corridor; 0 = Does not meet criteria

Table A-3: Cities over 50,000 within I-81's Southern Corridor

	Lynchburg			Richmond			Winston Salem			Durham			Greensboro			High Point			Raleigh			Charlotte			Asheville			Greenville			Fayetteville			Roanoke			Total
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Allentown	359	Y	1		N	0	483	Y	0		N	0	476	Y	0	493	Y	0		N	0	560	Y	0	597	Y	0	654	Y	0	493	N	0	374	Y	0	1
Altoona	286	Y	1		N	0	410	Y	0	403	Y	0	403	Y	0	419	Y	0		N	0	486	Y	0	523	Y	0	580	Y	0	484	N	0	301	Y	1	2
Charleston	213	Y	1	298	Y	1	218	Y	1	294	Y	1	243	Y	1	234	Y	1	318	Y	1	269	Y	1	287	Y	1	362	Y	1	337	Y	1	176	Y	1	12
Harrisburg	279	Y	1		N	0	404	Y	0		N	0	396	Y	0	413	Y	0		N	0	480	Y	0	517	Y	0	574	Y	0	437	N	0	294	Y	1	2
Huntington	263	Y	1	349	Y	1	268	Y	1	345	Y	1	293	Y	1	285	Y	1	369	Y	1	319	Y	1		N	0		N	0	388	Y	0	226	Y	1	9
Knoxville	310	Y	1	427	Y	0		N	0		N	0		N	0		N	0		N	0		N	0		N	0		N	0	361	N	0	258	Y	1	2
Lexington	385	Y	0	470	Y	0	359	Y	1	436	Y	0	384	Y	0	376	Y	0	460	Y	0		N	0		N	0		N	0	479	Y	0	347	Y	1	2
Pittsburgh	306	Y	1		N	0	392	Y	0	423	Y	0	417	Y	0	409	Y	0	446	Y	0	443	Y	0	461	Y	0	536	Y	0	511	Y	0	310	Y	1	2
Roanoke		N	0		N	0		N	0		N	0		N	0		N	0		N	0		N	0	237	Y	1		N	0	198	N	0		N	0	1
Total			6			2			3			2			2			2			2			2			2			1			1			7	32

1 Shortest Time Path between Origin and Destination from Automap (Miles)
2 Y = Uses I-81; N = Does not use I-81
3 1 = Meets criteria; 0 = Does not meet criteria

Table A-4: O-D Pairs within the I-81 Corridor Definition

Origin City & State		Destinations which use I-81 in its shortest time path
Akron	OH	Scranton
Albany	NY	Altoona, Binghamton, Harrisburg, Scranton, Wilkes Barre
Alexandria	VA	Binghamton, Roanoke, Scranton, Wilkes Barre
Allentown	PA	Binghamton, Buffalo, Harrisburg, Lynchburg, Rochester, Syracuse
Altoona	PA	Albany, Bristol, Danbury, Hartford, Lynchburg, Meriden, New Britain, Roanoke, Schenectady, Scranton, Syracuse, Troy, Utica, Waterbury
Annapolis	MD	Roanoke
Asheville	NC	Charleston, Roanoke
Baltimore	MD	Binghamton, Roanoke, Scranton, Syracuse, Wilkes Barre
Bayonne	NJ	Binghamton, Buffalo, Harrisburg, Pittsburgh, Rochester, Syracuse
Bethesda	MD	Binghamton, Roanoke, Scranton, Syracuse, Wilkes Barre
Binghamton	NY	Albany, Alexandria, Allentown, Baltimore, Bayonne, Bethesda, Boston, Brockton, Camden, Chicopee, Columbia, Elizabeth, East Orange, Framingham, Harrisburg, Jersey City, Lancaster, Lawerence, Lowell, Lynn, Manchester, Montreal, Nashua, Newark, Newton, New York, Oshawa, Ottawa, Quincy, Paterson, Philadelphia, Pittsfield, Reading, Schenectady, Scranton, Silver Springs, Springfield, Syracuse, Towson, Trenton, Troy, Union City, Utica, Vineland, Washington, DC, Weymouth, Wilkes Barre, Wilmington, Worcester
Boston	MA	Binghamton, Scranton, Wilkes Barre
Bridgeport	CT	Harrisburg, Scranton, Syracuse
Bristol	CT	Altoona, Harrisburg, Scranton, Wilkes Barre
Brockton	MA	Binghamton, Scranton, Wilkes Barre
Buffalo	NY	Bayonne, Elizabeth, East Orange, Jersey City, Lancaster, Newark, New York, Ottawa, Paterson, Trenton, Union City
Camden	NJ	Binghamton, Rochester, Syracuse
Canton	OH	Harrisburg, Roanoke, Scranton
Charleston	WV	Asheville, Charlotte, Durham, Fayetteville, Greensboro, Greenville, High Point, Lynchburg, Raleigh, Richmond, Roanoke, Winston Salem
Charlotte	NC	Charleston, Huntington
Chattanooga	TN	Roanoke
Chicopee	MA	Binghamton, Harrisburg, Scranton, Wilkes Barre
Cleveland	OH	Scranton
Columbia	MD	Binghamton, Roanoke, Scranton, Syracuse, Wilkes Barre
Columbia	SC	Charleston
Columbus	OH	Roanoke
Danbury	CT	Altoona, Harrisburg, Scranton, Syracuse, Wilkes Barre
Durham	NC	Charleston, Huntington
East Orange	NJ	Binghamton, Buffalo, Harrisburg, Rochester, Syracuse
Elizabeth	NJ	Binghamton, Buffalo, Harrisburg, Pittsburgh, Rochester, Syracuse
Erie	PA	Scranton
Euclid	OH	Scranton
Fall River	MA	Scranton, Wilkes Barre
Fayetteville	NC	Charleston
Framingham	MA	Binghamton, Harrisburg, Scranton, Wilkes Barre
Greensboro	NC	Charleston, Huntington
Greenville	SC	Charleston
Harrisburg	PA	Allentown, Albany, Bayonne, Binghamton, Bridgeport, Bristol, Canton, Chicopee, Danbury, East Orange, Elizabeth, Framingham, Hartford, Jersey City, Lynchburg, Meriden New Haven, New Rochelle, New York, Newark, Norwalk, Paterson, Pittsburgh, Pittsfield, Roanoke, Schenectady, Scranton, Springfield, Stamford, Syracuse, Troy, Union City, Utica,Wilkes Barre, Waterbury, Worcester, Yonkers
Hartford	CT	Altoona, Harrisburg, Scranton, Wilkes Barre
High Point	NC	Charleston, Huntington
Huntington	WV	Charlotte, Durham, Greensboro, High Point, Lynchburg, Raleigh, Richmond, Roanoke, Winston Salem

Origin City & State		Destinations which use I-81 in its shortest time path
Jersey City	NJ	Binghamton, Buffalo, Harrisburg, Rochester, Syracuse
Knoxville	TN	Lynchburg, Roanoke
Lancaster	PA	Binghamton, Buffalo, Roanoke, Rochester, Scranton, Syracuse, Wilkes Barre
Lawerence	MA	Binghamton, Scranton, Wilkes Barre
Lexington	KY	Roanoke, Winston Salem
Lowell	MA	Binghamton, Scranton, Wilkes Barre
Lynchburg	VA	Allentown, Altoona, Charleston, Harrisburg, Huntington, Knoxville, Pittsburgh
Lynn	MA	Binghamton, Scranton, Wilkes Barre
Manchester	NH	Binghamton, Scranton, Wilkes Barre
Meriden	CT	Altoona, Harrisburg, Scranton, Wilkes Barre
Montreal	PQ	Binghamton, Rochester, Syracuse
Nashua	NH	Binghamton, Scranton, Wilkes Barre
New Britain	CT	Altoona, Scranton, Wilkes Barre
New Haven	CT	Harrisburg, Scranton, Syracuse, Wilkes Barre
New Rochelle	NY	Harrisburg, Syracuse
New York	NY	Binghamton, Buffalo, Harrisburg, Rochester, Syracuse
Newark	NJ	Binghamton, Buffalo, Harrisburg, Pittsburgh, Rochester, Syracuse
Newton	MA	Binghamton, Scranton, Wilkes Barre
Norwalk	CT	Harrisburg, Scranton, Syracuse
Oshawa	ON	Binghamton, Syracuse
Ottawa	ON	Binghamton, Buffalo, Rochester, Scranton, Syracuse, Wilkes Barre
Paterson	NJ	Binghamton, Buffalo, Harrisburg, Rochester, Syracuse
Pawtucket	RI	Scranton, Wilkes Barre
Philadelphia	PA	Binghamton, Rochester, Syracuse
Pittsburgh	PA	Allentown, Bayonne, Elizabeth, Harrisburg, Lynchburg, Newark, Roanoke, Scranton
Pittsfield	MA	Binghamton, Harrisburg, Scranton, Wilkes Barre
Providence	RI	Scranton, Wilkes Barre
Quincy	MA	Binghamton, Scranton, Wilkes Barre
Raleigh	NC	Charleston, Huntington
Reading	PA	Binghamton, Scranton, Syracuse, Wilkes Barre
Richmond	VA	Charleston, Huntington, Scranton, Wilkes Barre
Roanoke	VA	Altoona, Alexandria, Annapolis, Asheville, Baltimore, Bethesda, Canton, Charleston, Chattanooga, Columbus, Columbia(MD), Harrisburg, Huntington, Knoxville, Lancaster, Lexington, Pittsburgh, Reading, Silver Springs, Towson, Washington DC, Wilmington, Youngstown
Rochester	NY	Allentown, Bayonne, Camden, East Orange, Elizabeth, Jersey City, Lancaster, Montreal, Newark, New York, Ottawa, Paterson, Philadelphia, Scranton, Trenton, Union City, Vineland
Schenectady	NY	Altoona, Binghamton, Harrisburg, Scranton, Wilkes Barre
Scranton	PA	Akron, Albany, Alexandria, Altoona, Baltimore, Bethesda, Binghamton, Boston, Bridgeport, Bristol, Brockton, Canton, Chicopee, Cleveland, Columbia, Danbury, Erie, Euclid, Fall River, Framingham, Harrisburg, Hartford, Lancaster, Lawerence, Lowell, Lynn Manchester, Meriden, Nashua, New Britain, New Haven, Newton, Norwalk, Ottawa, Pawtucket, Pittsburgh, Pittsfield, Providence, Quincy, Reading, Richmond, Rochester, Schenectady, Silver Springs, Springfield, Stamford, Syracuse, Towson, Troy, Utica Warwick, Warren, Washington DC, Waterbury, Weymouth, Worcester, Yonkers, Youngstown
Silver Springs	MD	Binghamton, Roanoke, Scranton, Syracuse, Wilkes Barre
Springfield	MA	Binghamton, Harrisburg, Scranton, Wilkes Barre
Stamford	CT	Harrisburg, Scranton, Syracuse
Syracuse	NY	Allentown, Altoona, Baltimore, Bayonne, Bethesda, Binghamton, Bridgeport, Camden, Columbia, Danbury, East Orange, Elizabeth, Harrisburg, Jersey City, Lancaster, Montreal Newark, New Haven, New Rochelle, New York, Norwalk, Ottawa, Oshawa, Paterson, Philadelphia, Reading, Scranton, Silver Springs, Stamford, Towson, Trenton, Union City, Vineland, Washington, DC, Wilkes Barre, Wilmington, Yonkers
Towson	MD	Binghamton, Scranton, Syracuse, Wilkes Barre
Trenton	NJ	Binghamton, Buffalo, Rochester, Syracuse

Origin City & State		Destinations which use I-81 in its shortest time path
Troy	NY	Altoona, Binghamton, Harrisburg, Scranton, Wilkes Barre
Union City	NJ	Binghamton, Buffalo, Harrisburg, Rochester, Syracuse
Utica	NY	Binghamton, Buffalo, Harrisburg, Scranton, Wilkes Barre
Vineland	NJ	Binghamton, Rochester, Syracuse
Warren	OH	Scranton
Warwick	RI	Scranton, Wilkes Barre
Washington	DC	Binghamton, Roanoke, Scranton, Syracuse, Wilkes Barre
Waterbury	CT	Altoona, Harrisburg, Scranton, Wilkes Barre
Weymouth	MA	Binghamton, Scranton, Wilkes Barre
Wilkes Barre	PA	Albany, Alexandria, Baltimore, Bethesda, Binghamton, Boston, Bristol, Brockton, Chicopee,Columbia, Danbury, Fall River, Framingham, Harrisburg, Hartford, Lancaster, Lawerence, Lowell, Lynn, Manchester, Meriden, Nashua, New Britain, New Haven, Newton, Ottawa, Pawtucket, Pittsfield, Providence, Quincy, Reading, Richmond, Schenectady, Silver Springs, Springfield, Syracuse, Towson, Troy, Utica, Warwick, Washington DC, Waterbury, Weymouth, Worcester
Wilmington	DE	Binghamton, Syracuse
Winston Salem	NC	Charleston, Huntington, Lexington
Worchester	MA	Binghamton, Harrisburg, Scranton, Wilkes Barre
Yonkers	NY	Harrisburg, Scranton, Syracuse
Youngstown	OH	Roanoke, Scranton

Table A-5: Number of Person Trips in 1988 expected to use I-81
(Based on Argonne National Laboratories Data)

	City	Total Person Trips (x1000)		
		Business	Non-Business	Total
1	New York City	324	2017	2341
2	Los Angeles	0	34	34
3	Chicago	6	142	148
4	Philadelphia	20	153	173
5	San Francisco	0	22	22
6	Detroit	4	33	37
7	Boston	15	402	417
8	Houston	2	111	113
9	Dallas	2	131	133
10	Washington DC	13	126	139
11	Atlanta	19	179	198
12	St Louis	1	79	80
13	Minneapolis	0	24	24
14	San Diego	0	9	9
15	Pittsburgh	279	1201	1480
16	Phoenix	0	33	33
17	Tampa	6	124	130
18	Seattle	0	7	7
19	Denver	0	21	21
20	Miami	9	244	253
21	Salt Lake City	0	7	7
22	Charlotte	15	84	99
23	Orlando	9	188	197
24	Las Vegas	0	24	24
25	Baltimore	4	43	47
26	Cleveland	16	265	281
27	Kansas City	1	34	35
28	El Paso	0	5	5
29	Cincinnati	10	67	77
30	Milwaukee	0	16	16
31	Sacramento	0	1	1
32	New Orleans	2	62	64
33	Columbus	21	160	181
34	Norfolk	2	45	47
35	San Antonio	0	17	17
36	Portland	0	2	2
37	Indianapolis	1	19	20
38	Hartford	9	142	151
39	Rochester	59	292	351

	City	Total Person Trips (x1000)		
		Business	Non-Business	Total
40	Oklahoma City	0	8	8
41	Buffalo	63	443	506
42	Memphis	2	29	31
43	Louisville	3	26	29
44	Nashville	6	53	59
45	Greensboro	16	79	95
46	Jacksonville	0	40	40
47	Tulsa	0	5	5
48	Austin	0	16	16
49	Syracuse	123	658	781
50	Tucson	0	10	10
51	Raleigh	9	50	59
52	Albuquerque	0	9	9
53	Reno	0	4	4
54	Lubbock	0	1	1
55	Midland	0	1	1
56	Omaha	0	5	5
57	Birmingham	2	23	25
58	Providence	0	15	15
59	Albany	2	43	45
60	Richmond	2	35	37
61	Harrisburg	221	712	933
62	Little Rock	0	8	8
63	Columbia	2	20	22
64	Chattanooga	0	11	11
65	Jackson	0	7	7
66	Madison	0	5	5
67	Macon	0	1	1
68	Charleston	4	27	31
69	Savannah	0	4	4
70	Portland	0	16	16
71	Springfield	0	1	1
72	Topeka	0	0	0
73	Davenport	0	0	0
74	Boise	0	0	0
75	Billings	0	0	0
76	Sioux Falls	0	0	0
77	Casper	0	0	0
78	Grand Forks	0	0	0
	TOTAL	1304	8930	10234

Table A-6: Origin-Destination Pairs and 1988 Estimates of Person Trips expected to use I-81
(Based on Argonne National Laboratories data)

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
1	NYC	NY	8	HST	TX	1	55	56	1610
1	NYC	NY	9	DFW	TX	1	61	62	1550
1	NYC	NY	11	ATL	GA	13	111	124	854
1	NYC	NY	12	STL	MO	1	56	57	976
1	NYC	NY	15	PIT	PA	43	273	316	379
1	NYC	NY	16	PHX	AZ	0	25	25	2445
1	NYC	NY	22	CLT	NC	8	40	48	618
1	NYC	NY	27	KC MCI	MO	1	21	22	1233
1	NYC	NY	28	ELP	TX	0	2	2	2150
1	NYC	NY	29	CIN CVG	OH	7	39	46	675
1	NYC	NY	32	NO MSY	LA	1	26	27	1335
1	NYC	NY	33	CMS CMH	OH	10	46	56	568
1	NYC	NY	35	SAT	TX	0	9	9	1820
1	NYC	NY	39	ROC	NY	54	262	316	322
1	NYC	NY	40	OKC	OK	0	5	5	1478
1	NYC	NY	41	BUF	NY	63	368	431	371
1	NYC	NY	42	MEM	TN	1	10	11	1102
1	NYC	NY	43	LUI SDF	KY	2	14	16	766
1	NYC	NY	44	NSH BNA	TN	2	21	23	900
1	NYC	NY	45	GSO	NC	8	40	48	528
1	NYC	NY	47	TUL	OK	0	4	4	1348
1	NYC	NY	48	AUS	TX	0	7	7	1713
1	NYC	NY	49	SYR	NY	99	457	556	257
1	NYC	NY	50	TUS	AZ	0	7	7	2429
1	NYC	NY	52	ABQ	NM	0	7	7	1997
1	NYC	NY	54	LBK LBB	TX	0	1	1	1795
1	NYC	NY	55	MID MAF	TX	0	1	1	1866
1	NYC	NY	57	BHM	AL	1	8	9	978
1	NYC	NY	61	HRG MDT	PA	5	13	18	191
1	NYC	NY	62	LIT	AR	0	3	3	1250
1	NYC	NY	63	CBA CAE	SC	2	12	14	717
1	NYC	NY	64	CHA	TN	0	3	3	828
1	NYC	NY	65	JAN	MS	0	2	2	1224
1	NYC	NY	67	MCN	GA	0	1	1	880
1	NYC	NY	68	CRW	WV	1	6	7	546
1	NYC	NY	71	SPI	IL	0	1	1	914
1	NYC	NY	72	TPK	KS	0	0	0	1273
2	LA	CA	7	BOS	MA	0	18	18	3017
2	LA	CA	34	NFK ORF	VA	0	3	3	2685
2	LA	CA	38	HTF BDL	CT	0	8	8	1541
2	LA	CA	59	ALB	NY	0	2	2	2853
2	LA	CA	60	RIC	VA	0	1	1	2598
2	LA	CA	61	HRG MDT	PA	0	1	1	2593
2	LA	CA	70	PDM PWM	ME	0	1	1	3138
3	CHI	IL	7	BOS	MA	1	76	77	994
3	CHI	IL	34	NFK ORF	VA	1	8	9	865
3	CHI	IL	38	HTF BDL	CT	0	22	22	908
3	CHI	IL	45	GSO	NC	1	6	7	708
3	CHI	IL	51	RDU	NC	2	13	15	784
3	CHI	IL	59	ALB	NY	0	8	8	816

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
3	CHI	IL	60	RIC	VA	1	6	7	747
3	CHI	IL	70	PDM PWM	ME	0	3	3	1086
4	PHL	PA	8	HST	TX	0	11	11	1511
4	PHL	PA	9	DFW	TX	0	11	11	1443
4	PHL	PA	28	ELP	TX	0	0	0	2066
4	PHL	PA	32	NO MSY	LA	0	6	6	1229
4	PHL	PA	35	SAT	TX	0	2	2	1737
4	PHL	PA	39	ROC	NY	5	24	29	314
4	PHL	PA	42	MEM	TN	0	3	3	1007
4	PHL	PA	44	NSH BNA	TN	1	7	8	787
4	PHL	PA	48	AUS	TX	0	1	1	1599
4	PHL	PA	49	SYR	NY	13	80	93	249
4	PHL	PA	55	MID MAF	TX	0	0	0	1765
4	PHL	PA	57	BHM	AL	0	2	2	868
4	PHL	PA	62	LIT	AR	0	1	1	1136
4	PHL	PA	64	CHA	TN	0	2	2	714
4	PHL	PA	65	JAN	MS	0	1	1	1106
4	PHL	PA	68	CRW	WV	1	2	3	482
5	SFO	CA	7	BOS	MA	0	15	15	3128
5	SFO	CA	34	NFK ORF	VA	0	1	1	3001
5	SFO	CA	38	HTF BDL	CT	0	3	3	3082
5	SFO	CA	59	ALB	NY	0	1	1	2975
5	SFO	CA	60	RIC	VA	0	1	1	2845
5	SFO	CA	70	PDM PWM	ME	0	1	1	3217
6	DTW	MI	22	CLT	NC	1	6	7	630
6	DTW	MI	38	HTF BDL	CT	1	8	9	728
6	DTW	MI	45	GSO	NC	1	3	4	592
6	DTW	MI	46	JAX	FL	0	8	8	1045
6	DTW	MI	51	RDU	NC	1	5	6	683
6	DTW	MI	60	RIC	VA	0	2	2	577
6	DTW	MI	63	CBA CAE	SC	0	1	1	724
7	BOS	MA	8	HST	TX	0	12	12	1830
7	BOS	MA	9	DFW	TX	0	14	14	1753
7	BOS	MA	11	ATL	GA	2	22	24	1108
7	BOS	MA	12	STL	MO	0	7	7	1207
7	BOS	MA	13	MSP	MN	0	14	14	1390
7	BOS	MA	14	SDO SAN	CA	0	5	5	2984
7	BOS	MA	15	PIT	PA	3	32	35	574
7	BOS	MA	16	PHX	AZ	0	5	5	2670
7	BOS	MA	18	SEA	WA	0	3	3	3016
7	BOS	MA	19	DEN	CO	0	12	12	1998
7	BOS	MA	21	SLC	UT	0	4	4	2376
7	BOS	MA	22	CLT	NC	1	9	10	848
7	BOS	MA	24	LAS	NV	0	16	16	2752
7	BOS	MA	26	CLE	OH	2	37	39	657
7	BOS	MA	27	KC MCI	MO	0	5	5	1435
7	BOS	MA	28	ELP	TX	0	1	1	2384
7	BOS	MA	29	CIN CVG	OH	1	11	12	869
7	BOS	MA	30	MKE	WI	0	9	9	1091
7	BOS	MA	31	SMT SMF	CA	0	1	1	2992
7	BOS	MA	32	NO MSY	LA	0	5	5	1507
7	BOS	MA	33	CMS CMH	OH	1	7	8	801
7	BOS	MA	35	SAT	TX	0	2	2	2018
7	BOS	MA	36	PDX	OR	0	1	1	3144
7	BOS	MA	37	IND	IN	1	6	7	929
7	BOS	MA	40	OKC	OK	0	1	1	1694

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
7	BOS	MA	42	MEM	TN	0	3	3	1341
7	BOS	MA	43	LUI SDF	KY	0	3	3	962
7	BOS	MA	44	NSH BNA	TN	0	4	4	1092
7	BOS	MA	45	GSO	NC	1	4	5	715
7	BOS	MA	47	TUL	OK	0	1	1	1535
7	BOS	MA	48	AUS	TX	0	2	2	1900
7	BOS	MA	50	TUS	AZ	0	1	1	2652
7	BOS	MA	52	ABQ	NM	0	2	2	2220
7	BOS	MA	53	RNO	NV	0	4	4	2866
7	BOS	MA	54	LBK LBB	TX	0	0	0	1982
7	BOS	MA	55	MID MAF	TX	0	0	0	2053
7	BOS	MA	56	OMA	NE	0	2	2	1469
7	BOS	MA	57	BHM	AL	0	2	2	1226
7	BOS	MA	61	HRG MDT	PA	2	15	17	378
7	BOS	MA	62	LIT	AR	0	1	1	1438
7	BOS	MA	63	CBA CAE	SC	0	2	2	955
7	BOS	MA	64	CHA	TN	0	1	1	1015
7	BOS	MA	65	JAN	MS	0	1	1	1455
7	BOS	MA	66	MSN	WI	0	3	3	1102
7	BOS	MA	67	MCN	GA	0	0	0	1067
7	BOS	MA	68	CRW	WV	0	1	1	751
7	BOS	MA	71	SPI	IL	0	0	0	1098
7	BOS	MA	72	TPK	KS	0	0	0	1460
7	BOS	MA	73	QDC	IA	0	0	0	1114
7	BOS	MA	74	BOI	ID	0	0	0	2685
7	BOS	MA	75	BIL	MT	0	0	0	2197
7	BOS	MA	76	FSD	SD	0	0	0	1508
7	BOS	MA	77	CSP	WY	0	0	0	1997
7	BOS	MA	78	GFK	ND	0	0	0	1673
8	HST	TX	10	WAS	DC	1	20	21	1365
8	HST	TX	25	BWI	MD	0	6	6	1404
8	HST	TX	38	HTF BDL	CT	0	3	3	1731
8	HST	TX	58	PVD	RI	0	1	1	1755
8	HST	TX	59	ALB	NY	0	1	1	1768
8	HST	TX	60	RIC	VA	0	1	1	1292
8	HST	TX	61	HRG MDT	PA	0	0	0	1417
8	HST	TX	70	PDM PWM	ME	0	1	1	1959
9	DFW	TX	10	WAS	DC	1	25	26	1307
9	DFW	TX	25	BWI	MD	0	7	7	1357
9	DFW	TX	34	NFK ORF	VA	0	3	3	1351
9	DFW	TX	38	HTF BDL	CT	0	4	4	1691
9	DFW	TX	58	PVD	RI	0	1	1	1703
9	DFW	TX	59	ALB	NY	0	1	1	1677
9	DFW	TX	60	RIC	VA	0	2	2	1253
9	DFW	TX	61	HRG MDT	PA	0	1	1	1365
9	DFW	TX	70	PDM PWM	ME	0	1	1	1881
10	WAS	DC	28	ELP	TX	0	2	2	1931
10	WAS	DC	32	NO MSY	LA	1	12	13	1099
10	WAS	DC	42	MEM	TN	1	8	9	854
10	WAS	DC	44	NSH BNA	TN	2	8	10	659
10	WAS	DC	48	AUS	TX	0	4	4	1465
10	WAS	DC	49	SYR	NY	6	34	40	357
10	WAS	DC	50	TUS	AZ	0	2	2	2244
10	WAS	DC	54	LBK LBB	TX	0	0	0	1600
10	WAS	DC	55	MID MAF	TX	0	0	0	1631
10	WAS	DC	57	BHM	AL	1	5	6	735

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
10	WAS	DC	62	LIT	AR	0	2	2	1005
10	WAS	DC	64	CHA	TN	0	2	2	580
10	WAS	DC	65	JAN	MS	0	2	2	973
11	ATL	GA	15	PIT	PA	3	15	18	683
11	ATL	GA	38	HTF BDL	CT	1	12	13	959
11	ATL	GA	39	ROC	NY	0	3	3	922
11	ATL	GA	41	BUF	NY	0	4	4	907
11	ATL	GA	49	SYR	NY	0	4	4	922
11	ATL	GA	58	PVD	RI	0	2	2	1003
11	ATL	GA	59	ALB	NY	0	3	3	1010
11	ATL	GA	61	HRG MDT	PA	0	2	2	688
11	ATL	GA	68	CRW	WV	0	1	1	501
12	STL	MO	34	NFK ORF	VA	0	3	3	903
12	STL	MO	38	HTF BDL	CT	0	6	6	1079
12	STL	MO	45	GSO	NC	0	1	1	724
12	STL	MO	58	PVD	RI	0	1	1	1108
12	STL	MO	59	ALB	NY	0	1	1	1041
12	STL	MO	60	RIC	VA	0	2	2	810
12	STL	MO	61	HRG MDT	PA	0	2	2	766
12	STL	MO	70	PDM PWM	ME	0	0	0	1281
13	MSP	MN	34	NFK ORF	VA	0	1	1	1232
13	MSP	MN	38	HTF BDL	CT	0	3	3	1316
13	MSP	MN	45	GSO	NC	0	1	1	1108
13	MSP	MN	51	RDU	NC	0	2	2	1225
13	MSP	MN	59	ALB	NY	0	1	1	1250
13	MSP	MN	60	RIC	VA	0	1	1	1147
13	MSP	MN	70	PDM PWM	ME	0	1	1	1468
14	SDO SAN	CA	34	NFK ORF	VA	0	1	1	2682
14	SDO SAN	CA	38	HTF BDL	CT	0	2	2	2901
14	SDO SAN	CA	58	PVD	RI	0	1	1	2912
14	SDO SAN	CA	59	ALB	NY	0	0	0	2852
14	SDO SAN	CA	60	RIC	VA	0	0	0	2575
14	SDO SAN	CA	61	HRG MDT	PA	0	0	0	2570
14	SDO SAN	CA	70	PDM PWM	ME	0	0	0	3103
15	PIT	PA	17	TPA	FL	3	40	43	1028
15	PIT	PA	20	MIA	FL	3	72	75	1180
15	PIT	PA	22	CLT	NC	3	9	12	495
15	PIT	PA	23	ORL MCO	FL	3	48	51	976
15	PIT	PA	32	NO MSY	LA	0	4	4	1138
15	PIT	PA	38	HTF BDL	CT	3	14	17	473
15	PIT	PA	45	GSO	NC	1	5	6	411
15	PIT	PA	46	JAX	FL	0	12	12	829
15	PIT	PA	51	RDU	NC	2	5	7	508
15	PIT	PA	57	BHM	AL	0	3	3	788
15	PIT	PA	59	ALB	NY	1	7	8	453
15	PIT	PA	61	HRG MDT	PA	211	656	867	197
15	PIT	PA	63	CBA CAE	SC	0	2	2	589
15	PIT	PA	64	CHA	TN	0	1	1	590
15	PIT	PA	67	MCN	GA	0	0	0	697
15	PIT	PA	69	SAV	GA	0	1	1	669
15	PIT	PA	70	PDM PWM	ME	0	2	2	690
16	PHX	AZ	34	NFK ORF	VA	0	1	1	2349
16	PHX	AZ	38	HTF BDL	CT	0	1	1	2570
16	PHX	AZ	59	ALB	NY	0	1	1	2493
16	PHX	AZ	60	RIC	VA	0	0	0	2233
16	PHX	AZ	61	HRG MDT	PA	0	0	0	2228

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
16	PHX	AZ	70	PDM PWM	ME	0	0	0	2750
17	TPA	FL	26	CLE	OH	3	48	51	1108
17	TPA	FL	41	BUF	NY	0	20	20	1293
17	TPA	FL	49	SYR	NY	0	12	12	1237
17	TPA	FL	68	CRW	WV	0	4	4	857
18	SEA	WA	34	NFK ORF	VA	0	1	1	2887
18	SEA	WA	38	HTF BDL	CT	0	1	1	2948
18	SEA	WA	45	GSO	NC	0	0	0	2714
18	SEA	WA	51	RDU	NC	0	1	1	2836
18	SEA	WA	59	ALB	NY	0	1	1	2846
18	SEA	WA	60	RIC	VA	0	0	0	2753
18	SEA	WA	70	PDM PWM	ME	0	0	0	3090
19	DEN	CO	34	NFK ORF	VA	0	1	1	1766
19	DEN	CO	38	HTF BDL	CT	0	3	3	1997
19	DEN	CO	45	GSO	NC	0	1	1	1581
19	DEN	CO	51	RDU	NC	0	2	2	1715
19	DEN	CO	60	RIC	VA	0	1	1	1667
19	DEN	CO	61	HRG MDT	PA	0	0	0	1589
19	DEN	CO	70	PDM PWM	ME	0	1	1	2072
20	MIA	FL	26	CLE	OH	3	80	83	1252
20	MIA	FL	33	CMS CMH	OH	3	36	39	1171
20	MIA	FL	41	BUF	NY	0	28	28	1400
20	MIA	FL	49	SYR	NY	0	24	24	1386
20	MIA	FL	68	CRW	WV	0	4	4	1008
21	SLC	UT	26	CLE	OH	0	1	1	1762
21	SLC	UT	34	NFK ORF	VA	0	0	0	2223
21	SLC	UT	38	HTF BDL	CT	0	1	1	2269
21	SLC	UT	45	GSO	NC	0	0	0	2040
21	SLC	UT	51	RDU	NC	0	1	1	2214
21	SLC	UT	59	ALB	NY	0	0	0	2245
21	SLC	UT	60	RIC	VA	0	0	0	2100
21	SLC	UT	70	PDM PWM	ME	0	0	0	2509
22	CLT	NC	26	CLE	OH	1	7	8	516
22	CLT	NC	33	CMS CMH	OH	1	4	5	435
22	CLT	NC	38	HTF BDL	CT	0	3	3	741
22	CLT	NC	39	ROC	NY	0	1	1	693
22	CLT	NC	41	BUF	NY	0	1	1	707
22	CLT	NC	49	SYR	NY	0	1	1	690
22	CLT	NC	58	PVD	RI	0	1	1	768
22	CLT	NC	59	ALB	NY	0	1	1	772
22	CLT	NC	61	HRG MDT	PA	0	1	1	456
22	CLT	NC	70	PDM PWM	ME	0	0	0	957
23	ORL MCO	FL	26	CLE	OH	3	60	63	1046
23	ORL MCO	FL	33	CMS CMH	OH	3	44	47	960
23	ORL MCO	FL	41	BUF	NY	0	16	16	1204
23	ORL MCO	FL	49	SYR	NY	0	16	16	1185
23	ORL MCO	FL	68	CRW	WV	0	4	4	802
24	LAS	NV	34	NFK ORF	VA	0	4	4	2478
24	LAS	NV	38	HTF BDL	CT	0	4	4	2659
24	LAS	NV	59	ALB	NY	0	0	0	2634
24	LAS	NV	60	RIC	VA	0	0	0	2376
24	LAS	NV	61	HRG MDT	PA	0	0	0	2336
24	LAS	NV	70	PDM PWM	ME	0	0	0	2860
25	BWI	MD	32	NO MSY	LA	0	3	3	1135
25	BWI	MD	35	SAT	TX	0	2	2	1632
25	BWI	MD	42	MEM	TN	0	2	2	911

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
25	BWI	MD	44	NSH BNA	TN	1	3	4	702
25	BWI	MD	48	AUS	TX	0	1	1	1503
25	BWI	MD	49	SYR	NY	3	14	17	321
25	BWI	MD	55	MID MAF	TX	0	0	0	1669
25	BWI	MD	57	BHM	AL	0	2	2	771
25	BWI	MD	62	LIT	AR	0	1	1	1042
25	BWI	MD	64	CHA	TN	0	1	1	618
25	BWI	MD	65	JAN	MS	0	1	1	1012
26	CLE	OH	38	HTF BDL	CT	1	10	11	558
26	CLE	OH	45	GSO	NC	1	2	3	491
26	CLE	OH	46	JAX	FL	0	8	8	909
26	CLE	OH	51	RDU	NC	1	4	5	561
26	CLE	OH	59	ALB	NY	1	5	6	484
26	CLE	OH	63	CBA CAE	SC	0	1	1	610
26	CLE	OH	69	SAV	GA	0	1	1	739
26	CLE	OH	70	PDM PWM	ME	0	1	1	729
27	KC MCI	MO	34	NFK ORF	VA	0	1	1	1160
27	KC MCI	MO	38	HTF BDL	CT	0	1	1	1336
27	KC MCI	MO	45	GSO	NC	0	1	1	977
27	KC MCI	MO	51	RDU	NC	0	1	1	1087
27	KC MCI	MO	58	PVD	RI	0	1	1	1358
27	KC MCI	MO	59	ALB	NY	0	1	1	1298
27	KC MCI	MO	60	RIC	VA	0	1	1	1063
27	KC MCI	MO	61	HRG MDT	PA	0	1	1	1016
28	ELP	TX	34	NFK ORF	VA	0	0	0	1953
28	ELP	TX	38	HTF BDL	CT	0	0	0	2293
28	ELP	TX	58	PVD	RI	0	0	0	2279
28	ELP	TX	59	ALB	NY	0	0	0	2220
28	ELP	TX	60	RIC	VA	0	0	0	1870
28	ELP	TX	61	HRG MDT	PA	0	0	0	1937
28	ELP	TX	70	PDM PWM	ME	0	0	0	2462
29	CIN CVG	OH	34	NFK ORF	VA	0	2	2	613
29	CIN CVG	OH	38	HTF BDL	CT	0	4	4	769
29	CIN CVG	OH	45	GSO	NC	1	2	3	449
29	CIN CVG	OH	51	RDU	NC	1	3	4	520
29	CIN CVG	OH	58	PVD	RI	0	1	1	810
29	CIN CVG	OH	59	ALB	NY	0	1	1	746
29	CIN CVG	OH	60	RIC	VA	0	2	2	509
29	CIN CVG	OH	61	HRG MDT	PA	0	1	1	468
29	CIN CVG	OH	70	PDM PWM	ME	0	1	1	978
30	MKE	WI	34	NFK ORF	VA	0	1	1	952
30	MKE	WI	38	HTF BDL	CT	0	2	2	995
30	MKE	WI	45	GSO	NC	0	1	1	794
30	MKE	WI	51	RDU	NC	0	1	1	933
30	MKE	WI	59	ALB	NY	0	1	1	927
30	MKE	WI	60	RIC	VA	0	1	1	833
30	MKE	WI	70	PDM PWM	ME	0	0	0	1164
31	SMT SMF	CA	34	NFK ORF	VA	0	0	0	2842
31	SMT SMF	CA	38	HTF BDL	CT	0	0	0	2909
31	SMT SMF	CA	45	GSO	NC	0	0	0	2692
31	SMT SMF	CA	51	RDU	NC	0	0	0	2763
31	SMT SMF	CA	59	ALB	NY	0	0	0	2829
31	SMT SMF	CA	60	RIC	VA	0	0	0	2752
31	SMT SMF	CA	70	PDM PWM	ME	0	0	0	3060
32	NO MSY	LA	38	HTF BDL	CT	0	2	2	1427
32	NO MSY	LA	49	SYR	NY	0	1	1	1353

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
32	NO MSY	LA	58	PVD	RI	0	1	1	1457
32	NO MSY	LA	59	ALB	NY	0	1	1	1443
32	NO MSY	LA	61	HRG MDT	PA	0	0	0	1119
32	NO MSY	LA	68	CRW	WV	0	0	0	905
32	NO MSY	LA	70	PDM PWM	ME	0	1	1	1642
33	CMS CMH	OH	34	NFK ORF	VA	0	2	2	563
33	CMS CMH	OH	38	HTF BDL	CT	1	3	4	660
33	CMS CMH	OH	45	GSO	NC	0	2	2	409
33	CMS CMH	OH	46	JAX	FL	0	4	4	825
33	CMS CMH	OH	51	RDU	NC	1	2	3	512
33	CMS CMH	OH	58	PVD	RI	0	1	1	704
33	CMS CMH	OH	59	ALB	NY	0	1	1	637
33	CMS CMH	OH	60	RIC	VA	0	2	2	449
33	CMS CMH	OH	61	HRG MDT	PA	1	3	4	362
33	CMS CMH	OH	63	CBA CAE	SC	0	1	1	529
33	CMS CMH	OH	69	SAV	GA	0	1	1	657
33	CMS CMH	OH	70	PDM PWM	ME	0	1	1	869
34	NFK ORF	VA	36	PDX	OR	0	0	0	2968
34	NFK ORF	VA	37	IND	IN	0	2	2	705
34	NFK ORF	VA	40	OKC	OK	0	1	1	1365
34	NFK ORF	VA	42	MEM	TN	0	1	1	881
34	NFK ORF	VA	43	LUI SDF	KY	0	1	1	647
34	NFK ORF	VA	44	NSH BNA	TN	0	2	2	672
34	NFK ORF	VA	47	TUL	OK	0	0	0	1264
34	NFK ORF	VA	49	SYR	NY	1	3	4	502
34	NFK ORF	VA	50	TUS	AZ	0	0	0	2263
34	NFK ORF	VA	52	ABQ	NM	0	0	0	1888
34	NFK ORF	VA	53	RNO	NV	0	0	0	2793
34	NFK ORF	VA	54	LBK LBB	TX	0	0	0	1615
34	NFK ORF	VA	55	MID MAF	TX	0	0	0	1640
34	NFK ORF	VA	56	OMA	NE	0	1	1	1318
34	NFK ORF	VA	62	LIT	AR	0	0	0	1023
34	NFK ORF	VA	66	MSN	WI	0	0	0	973
34	NFK ORF	VA	68	CRW	WV	0	1	1	405
34	NFK ORF	VA	71	SPI	IL	0	0	0	891
34	NFK ORF	VA	72	TPK	KS	0	0	0	1219
34	NFK ORF	VA	73	QDC	IA	0	0	0	984
34	NFK ORF	VA	74	BOI	ID	0	0	0	2522
34	NFK ORF	VA	75	BIL	MT	0	0	0	2078
34	NFK ORF	VA	76	FSD	SD	0	0	0	1379
34	NFK ORF	VA	77	CSP	WY	0	0	0	1868
34	NFK ORF	VA	78	GFK	ND	0	0	0	1544
35	SAT	TX	38	HTF BDL	CT	0	1	1	1911
35	SAT	TX	58	PVD	RI	0	0	0	1942
35	SAT	TX	59	ALB	NY	0	0	0	1970
35	SAT	TX	60	RIC	VA	0	1	1	1481
35	SAT	TX	61	HRG MDT	PA	0	0	0	1604
35	SAT	TX	70	PDM PWM	ME	0	0	0	2125
36	PDX	OR	38	HTF BDL	CT	0	1	1	2998
36	PDX	OR	45	GSO	NC	0	0	0	2757
36	PDX	OR	51	RDU	NC	0	0	0	2916
36	PDX	OR	59	ALB	NY	0	0	0	2920
36	PDX	OR	60	RIC	VA	0	0	0	2817
36	PDX	OR	70	PDM PWM	ME	0	0	0	3216
37	IND	IN	38	HTF BDL	CT	0	3	3	835
37	IND	IN	45	GSO	NC	0	1	1	551

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
37	IND	IN	51	RDU	NC	0	2	2	662
37	IND	IN	58	PVD	RI	0	1	1	874
37	IND	IN	59	ALB	NY	0	1	1	807
37	IND	IN	60	RIC	VA	0	1	1	610
37	IND	IN	61	HRG MDT	PA	0	1	1	532
37	IND	IN	70	PDM PWM	ME	0	1	1	1051
38	HTF BDL	CT	40	OKC	OK	0	1	1	1640
38	HTF BDL	CT	42	MEM	TN	0	1	1	1200
38	HTF BDL	CT	43	LUI SDF	KY	0	1	1	873
38	HTF BDL	CT	44	NSH BNA	TN	0	2	2	1001
38	HTF BDL	CT	45	GSO	NC	0	1	1	618
38	HTF BDL	CT	47	TUL	OK	0	0	0	1438
38	HTF BDL	CT	48	AUS	TX	0	1	1	1803
38	HTF BDL	CT	50	TUS	AZ	0	0	0	2503
38	HTF BDL	CT	51	RDU	NC	1	3	4	620
38	HTF BDL	CT	52	ABQ	NM	0	0	0	2102
38	HTF BDL	CT	53	RNO	NV	0	0	0	2798
38	HTF BDL	CT	54	LBK LBB	TX	0	0	0	1885
38	HTF BDL	CT	55	MID MAF	TX	0	0	0	1956
38	HTF BDL	CT	56	OMA	NE	0	1	1	1370
38	HTF BDL	CT	57	BHM	AL	0	1	1	1082
38	HTF BDL	CT	61	HRG MDT	PA	1	3	4	281
38	HTF BDL	CT	62	LIT	AR	0	0	0	1340
38	HTF BDL	CT	63	CBA CAE	SC	0	1	1	812
38	HTF BDL	CT	64	CHA	TN	0	0	0	918
38	HTF BDL	CT	65	JAN	MS	0	0	0	1348
38	HTF BDL	CT	66	MSN	WI	0	1	1	1019
38	HTF BDL	CT	67	MCN	GA	0	0	0	970
38	HTF BDL	CT	68	CRW	WV	0	0	0	684
38	HTF BDL	CT	71	SPI	IL	0	0	0	1004
38	HTF BDL	CT	72	TPK	KS	0	0	0	1363
38	HTF BDL	CT	73	QDC	IA	0	0	0	1031
38	HTF BDL	CT	74	BOI	ID	0	0	0	2611
38	HTF BDL	CT	75	BIL	MT	0	0	0	2098
38	HTF BDL	CT	76	FSD	SD	0	0	0	1425
38	HTF BDL	CT	77	CSP	WY	0	0	0	1914
38	HTF BDL	CT	78	GFK	ND	0	0	0	1590
39	ROC	NY	45	GSO	NC	0	1	1	604
39	ROC	NY	62	LIT	AR	0	0	0	1103
39	ROC	NY	66	MSN	WI	0	1	1	727
39	ROC	NY	67	MCN	GA	0	0	0	956
40	OKC	OK	59	ALB	NY	0	0	0	1499
40	OKC	OK	60	RIC	VA	0	0	0	1262
40	OKC	OK	61	HRG MDT	PA	0	0	0	1260
40	OKC	OK	70	PDM PWM	ME	0	0	0	1736
41	BUF	NY	45	GSO	NC	0	1	1	580
41	BUF	NY	46	JAX	FL	0	4	4	1094
41	BUF	NY	63	CBA CAE	SC	0	0	0	801
41	BUF	NY	67	MCN	GA	0	0	0	906
41	BUF	NY	69	SAV	GA	0	1	1	878
42	MEM	TN	58	PVD	RI	0	0	0	1251
42	MEM	TN	59	ALB	NY	0	0	0	1231
42	MEM	TN	60	RIC	VA	0	1	1	801
42	MEM	TN	61	HRG MDT	PA	0	0	0	913
42	MEM	TN	70	PDM PWM	ME	0	0	0	1462
43	LUI SDF	KY	45	GSO	NC	1	2	3	466

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
43	LUI SDF	KY	51	RDU	NC	0	1	1	604
43	LUI SDF	KY	58	PVD	RI	0	0	0	911
43	LUI SDF	KY	59	ALB	NY	0	1	1	858
43	LUI SDF	KY	60	RIC	VA	0	2	2	552
43	LUI SDF	KY	61	HRG MDT	PA	0	1	1	569
43	LUI SDF	KY	70	PDM PWM	ME	0	0	0	1095
44	NSH BNA	TN	58	PVD	RI	0	1	1	1045
44	NSH BNA	TN	59	ALB	NY	0	1	1	1034
44	NSH BNA	TN	60	RIC	VA	0	3	3	595
44	NSH BNA	TN	61	HRG MDT	PA	0	1	1	707
44	NSH BNA	TN	70	PDM PWM	ME	0	0	0	1201
45	GSO	NC	49	SYR	NY	0	1	1	601
45	GSO	NC	56	OMA	NE	0	0	0	1130
45	GSO	NC	58	PVD	RI	0	1	1	679
45	GSO	NC	59	ALB	NY	0	0	0	639
45	GSO	NC	61	HRG MDT	PA	0	2	2	367
45	GSO	NC	66	MSN	WI	0	0	0	846
45	GSO	NC	68	CRW	WV	1	0	1	247
45	GSO	NC	70	PDM PWM	ME	0	0	0	815
45	GSO	NC	71	SPI	IL	0	0	0	742
45	GSO	NC	72	TPK	KS	0	0	0	1043
45	GSO	NC	73	QDC	IA	0	0	0	848
45	GSO	NC	74	BOI	ID	0	0	0	2336
45	GSO	NC	75	BIL	MT	0	0	0	1910
45	GSO	NC	76	FSD	SD	0	0	0	1252
45	GSO	NC	77	CSP	WY	0	0	0	1737
45	GSO	NC	78	GFK	ND	0	0	0	1417
46	JAX	FL	49	SYR	NY	0	4	4	1047
46	JAX	FL	68	CRW	WV	0	0	0	658
47	TUL	OK	58	PVD	RI	0	0	0	1499
47	TUL	OK	59	ALB	NY	0	0	0	1386
47	TUL	OK	60	RIC	VA	0	0	0	1198
47	TUL	OK	61	HRG MDT	PA	0	0	0	1157
47	TUL	OK	70	PDM PWM	ME	0	0	0	1617
48	AUS	TX	58	PVD	RI	0	0	0	1864
48	AUS	TX	59	ALB	NY	0	0	0	1792
48	AUS	TX	60	RIC	VA	0	0	0	1414
48	AUS	TX	61	HRG MDT	PA	0	0	0	1526
48	AUS	TX	70	PDM PWM	ME	0	0	0	2000
49	SYR	NY	51	RDU	NC	0	2	2	605
49	SYR	NY	57	BHM	AL	0	0	0	1013
49	SYR	NY	60	RIC	VA	0	1	1	459
49	SYR	NY	61	HRG MDT	PA	1	4	5	244
49	SYR	NY	63	CBA CAE	SC	0	0	0	777
49	SYR	NY	64	CHA	TN	0	0	0	875
49	SYR	NY	65	JAN	MS	0	0	0	1238
49	SYR	NY	67	MCN	GA	0	0	0	953
49	SYR	NY	69	SAV	GA	0	0	0	910
50	TUS	AZ	58	PVD	RI	0	0	0	2538
50	TUS	AZ	59	ALB	NY	0	0	0	2473
50	TUS	AZ	60	RIC	VA	0	0	0	2168
50	TUS	AZ	61	HRG MDT	PA	0	0	0	2196
50	TUS	AZ	70	PDM PWM	ME	0	0	0	2736
51	RDU	NC	56	OMA	NE	0	1	1	1294
51	RDU	NC	66	MSN	WI	0	0	0	917
51	RDU	NC	68	CRW	WV	0	1	1	345

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
51	RDU	NC	71	SPI	IL	0	0	0	813
51	RDU	NC	72	TPK	KS	0	0	0	1114
51	RDU	NC	73	QDC	IA	0	0	0	919
51	RDU	NC	74	BOI	ID	0	0	0	2482
51	RDU	NC	75	BIL	MT	0	0	0	2066
51	RDU	NC	76	FSD	SD	0	0	0	1323
51	RDU	NC	77	CSP	WY	0	0	0	1808
51	RDU	NC	78	GFK	ND	0	0	0	1488
52	ABQ	NM	58	PVD	RI	0	0	0	2141
52	ABQ	NM	59	ALB	NY	0	0	0	2041
52	ABQ	NM	60	RIC	VA	0	0	0	1804
52	ABQ	NM	61	HRG MDT	PA	0	0	0	1799
52	ABQ	NM	70	PDM PWM	ME	0	0	0	2304
53	RNO	NV	59	ALB	NY	0	0	0	2763
53	RNO	NV	60	RIC	VA	0	0	0	2619
53	RNO	NV	70	PDM PWM	ME	0	0	0	2968
54	LBK LBB	TX	58	PVD	RI	0	0	0	1946
54	LBK LBB	TX	59	ALB	NY	0	0	0	1833
54	LBK LBB	TX	60	RIC	VA	0	0	0	1549
54	LBK LBB	TX	61	HRG MDT	PA	0	0	0	1604
54	LBK LBB	TX	70	PDM PWM	ME	0	0	0	2064
55	MID MAF	TX	58	PVD	RI	0	0	0	2017
55	MID MAF	TX	59	ALB	NY	0	0	0	1904
55	MID MAF	TX	60	RIC	VA	0	0	0	1580
55	MID MAF	TX	61	HRG MDT	PA	0	0	0	1675
55	MID MAF	TX	70	PDM PWM	ME	0	0	0	2135
56	OMA	NE	59	ALB	NY	0	0	0	1310
56	OMA	NE	60	RIC	VA	0	0	0	1189
56	OMA	NE	70	PDM PWM	ME	0	0	0	1529
57	BHM	AL	58	PVD	RI	0	0	0	1117
57	BHM	AL	59	ALB	NY	0	0	0	1071
57	BHM	AL	61	HRG MDT	PA	0	0	0	779
57	BHM	AL	68	CRW	WV	0	0	0	561
57	BHM	AL	70	PDM PWM	ME	0	0	0	1343
58	PVD	RI	61	HRG MDT	PA	0	1	1	342
58	PVD	RI	62	LIT	AR	0	0	0	1387
58	PVD	RI	63	CBA CAE	SC	0	0	0	849
58	PVD	RI	64	CHA	TN	0	0	0	979
58	PVD	RI	65	JAN	MS	0	0	0	1353
58	PVD	RI	67	MCN	GA	0	0	0	1031
58	PVD	RI	68	CRW	WV	0	0	0	700
58	PVD	RI	71	SPI	IL	0	0	0	1065
58	PVD	RI	72	TPK	KS	0	0	0	1424
59	ALB	NY	61	HRG MDT	PA	0	2	2	273
59	ALB	NY	62	LIT	AR	0	0	0	1357
59	ALB	NY	63	CBA CAE	SC	0	0	0	822
59	ALB	NY	64	CHA	TN	0	0	0	914
59	ALB	NY	65	JAN	MS	0	0	0	1349
59	ALB	NY	66	MSN	WI	0	0	0	939
59	ALB	NY	67	MCN	GA	0	0	0	991
59	ALB	NY	68	CRW	WV	0	0	0	636
59	ALB	NY	71	SPI	IL	0	0	0	935
59	ALB	NY	72	TPK	KS	0	0	0	1303
59	ALB	NY	73	QDC	IA	0	0	0	951
59	ALB	NY	74	BOI	ID	0	0	0	2518
59	ALB	NY	75	BIL	MT	0	0	0	2098

Origin			Destination			Business (x1000)	Non-Business (x1000)	Total (x1000)	Distance (mi)
59	ALB	NY	76	FSD	SD	0	0	0	1345
59	ALB	NY	77	CSP	WY	0	0	0	1834
59	ALB	NY	78	GFK	ND	0	0	0	1510
60	RIC	VA	62	LIT	AR	0	0	0	937
60	RIC	VA	64	CHA	TN	0	1	1	529
60	RIC	VA	66	MSN	WI	0	0	0	885
60	RIC	VA	68	CRW	WV	1	2	3	305
60	RIC	VA	71	SPI	IL	0	0	0	801
60	RIC	VA	72	TPK	KS	0	0	0	1129
60	RIC	VA	73	QDC	IA	0	0	0	896
60	RIC	VA	74	BOI	ID	0	0	0	2396
60	RIC	VA	75	BIL	MT	0	0	0	1949
60	RIC	VA	76	FSD	SD	0	0	0	1291
60	RIC	VA	77	CSP	WY	0	0	0	1780
60	RIC	VA	78	GFK	ND	0	0	0	1456
61	HRG MDT	PA	62	LIT	AR	0	0	0	1049
61	HRG MDT	PA	63	CBA CAE	SC	0	0	0	543
61	HRG MDT	PA	64	CHA	TN	0	0	0	641
61	HRG MDT	PA	65	JAN	MS	0	0	0	1015
61	HRG MDT	PA	67	MCN	GA	0	0	0	719
61	HRG MDT	PA	68	CRW	WV	0	1	1	358
61	HRG MDT	PA	70	PDM PWM	ME	0	0	0	478
61	HRG MDT	PA	71	SPI	IL	0	0	0	723
61	HRG MDT	PA	72	TPK	KS	0	0	0	1082
62	LIT	AR	70	PDM PWM	ME	0	0	0	1600
63	CBA CAE	SC	68	CRW	WV	0	0	0	362
63	CBA CAE	SC	70	PDM PWM	ME	0	0	0	1043
64	CHA	TN	68	CRW	WV	0	0	0	412
64	CHA	TN	70	PDM PWM	ME	0	0	0	1115
65	JAN	MS	70	PDM PWM	ME	0	0	0	1587
66	MSN	WI	70	PDM PWM	ME	0	0	0	1170
67	MCN	GA	68	CRW	WV	0	0	0	523
67	MCN	GA	70	PDM PWM	ME	0	0	0	1167
68	CRW	WV	69	SAV	GA	0	0	0	495
68	CRW	WV	70	PDM PWM	ME	0	0	0	882
70	PDM PWM	ME	71	SPI	IL	0	0	0	1166
70	PDM PWM	ME	72	TPK	KS	0	0	0	1534
70	PDM PWM	ME	73	QDC	IA	0	0	0	1182
70	PDM PWM	ME	74	BOI	ID	0	0	0	2793
70	PDM PWM	ME	75	BIL	MT	0	0	0	2266
70	PDM PWM	ME	76	FSD	SD	0	0	0	1576
70	PDM PWM	ME	77	CSP	WY	0	0	0	2065
70	PDM PWM	ME	78	GFK	ND	0	0	0	1741
						652	4465	5117	814824