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## **ABSTRACT**

### **A STUDY OF TRANSIT CORRIDORS WITHIN THE NJTPA REGION**

**by**  
**Mark Kagen Berger**

Identifying potential bus and rail transit corridors for the North Jersey Transportation Planning Authority (NJTPA) region by examining current travel patterns of commuters was the purpose of this thesis. The current transit corridors within the NJTPA region was discussed first, followed by the methods for selecting specific municipalities for analysis. At this point, specific examinations of the selected municipalities' origin and destination travel patterns were mapped. The results were then summed up, along with a discussion of potential new bus and rail transit corridors based on trips originating along a corridor enroute to the same municipality. The final discussion examined the travel patterns of the five boroughs of New York and Trenton and their origins within the NJTPA region.

**A STUDY OF TRANSIT CORRIDORS WITHIN THE NJTPA REGION**

by  
**Mark Kagen Berger**

**A Thesis  
Submitted to the Faculty of  
New Jersey Institute of Technology  
in Partial Fulfillment of the Requirements for the Degree of  
Master of Science in Transportation**

**Committee for the Interdisciplinary Program in Transportation**

**May 1995**

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**This Thesis is dedicated to  
Neil D. Muller**

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## **CHAPTER 1**

### **INTRODUCTION**

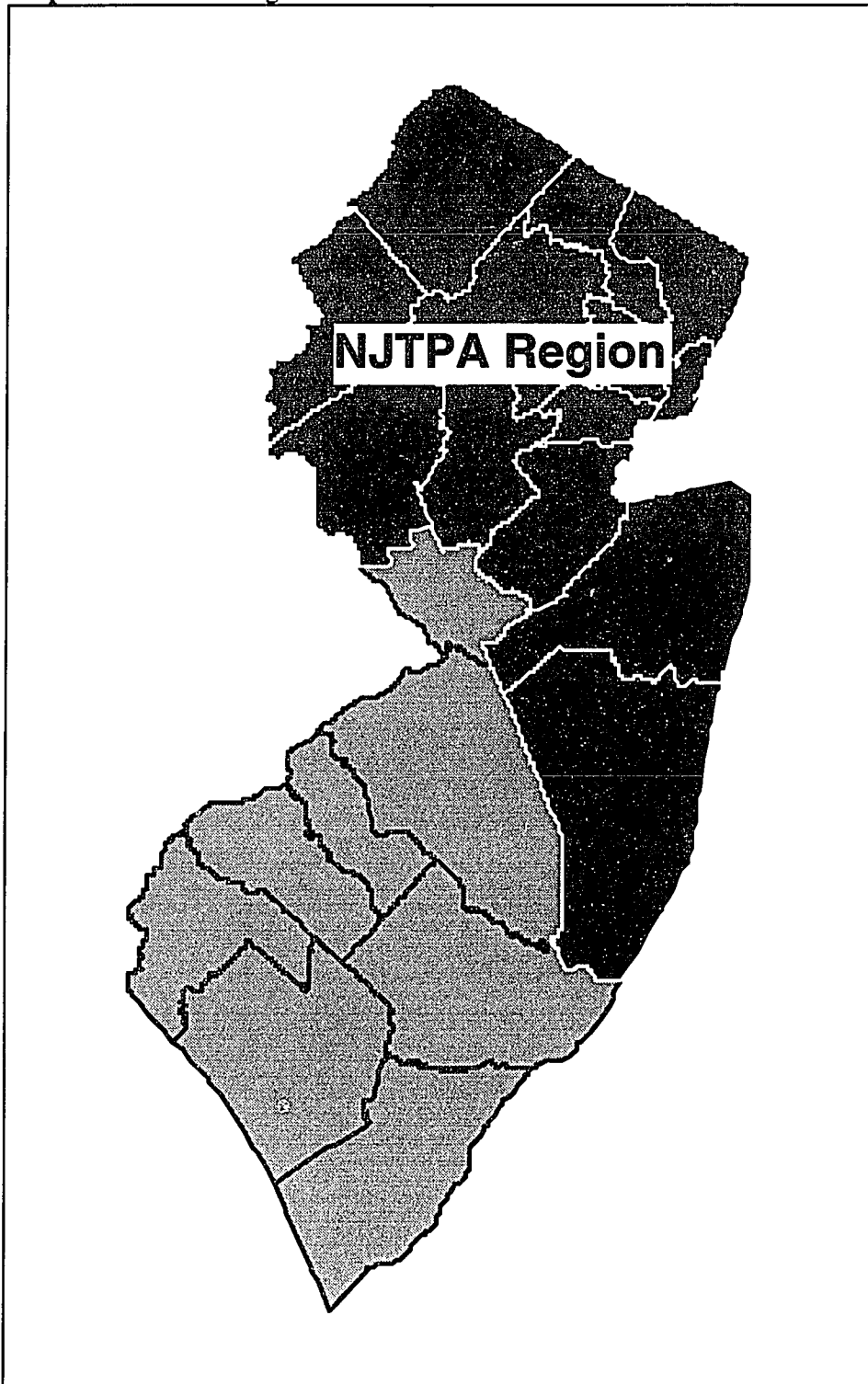
The purpose of this thesis is to identify potential bus and rail transit corridors for the North Jersey Transportation Planning Authority (NJTPA) region by examining current travel patterns of commuters. The primary tools used to identify corridor patterns are the 1990 Journey to Work Data, published by the United States Census Bureau, and the MapInfo Desktop Mapping Software Package.

Chapter 2 analyzes the current transit corridors within the NJTPA region. The method of selecting specific municipalities for their corridor analysis is discussed in Chapter 3. Chapter 4 is a specific examination of the selected municipalities' origin and destination travel patterns. The origin travel patterns of the five boroughs of New York and Trenton and their application to the NJTPA region are studied in Chapter 5. Chapter 6 concludes with proposed bus and rail lines for specific municipalities within the NJTPA region.

The NJTPA is the Metropolitan Planning Organization (MPO) for thirteen counties in New Jersey (Map 1). The thirteen counties are as follows: Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren. From its widest points, the NJTPA region spans 132 miles north to south and 75 miles east to west. In total, the region is 4,761 square miles.

For purposes of this thesis, a corridor is defined as an elongated area of dense population (2). Origin and destination patterns create a corridor. Origins refer to the

**Map 1** The NJTPA Region



Created by the MapInfo Desktop Mapping Package

residence of the commuter, while destination applies to the workplace of the commuter. The line between the origin and destination is referred to as a journey to work. A corridor can either attract or produce trips. Trips are attracted when they are drawn to a destination within a municipality from a location outside. On the other hand, trips are produced when they originate from a municipality.

Most journey to work travel patterns have their destinations terminating at a central business district (CBD). CBDs originated due to a need for market places. The CBDs are other hubs of transit corridors and the central locations of work places because they can produce high trip densities that are conducive to transit. As companies began to move to the suburbs, large corporate parks were created and there was a rise in suburb to suburb commutes. As will be demonstrated in this thesis, many corporate parks developed in clusters, resulting in the creation of smaller CBDs. The smaller CBDs are a primary focus of this thesis because they represent potential markets for transit services.



## **CHAPTER 2**

### **CURRENT TRANSIT CORRIDORS FOR THE NJTPA REGION**

#### **2.1 Introduction**

This chapter analyzes the current ten transit corridors within the NJTPA region by comparing the number of jobs and the number of commuters. If the number of jobs exceeds commuters, then the corridor has an attraction of trips from points outside. If, on the other hand, there are more commuters than jobs, then the corridor is expected to produce trips to points outside. The types of transit targeted for analysis are first discussed. The second task describes the methods used to draw and analyze the corridors. The third step is a detailed analysis of each of the ten transit corridors.

#### **2.2 Transit Modes**

NJ Transit's commuter rail and bus systems are the primary transit modes studied. For one corridor, the Hudson Waterfront, the Port Authority Trans Hudson (PATH) and NJ Transit's City Subway line are included. The bus and commuter rail network shapes the other corridors.

#### **2.3 The Corridors**

##### **2.3.1 Procedure for Analyzing Corridors**

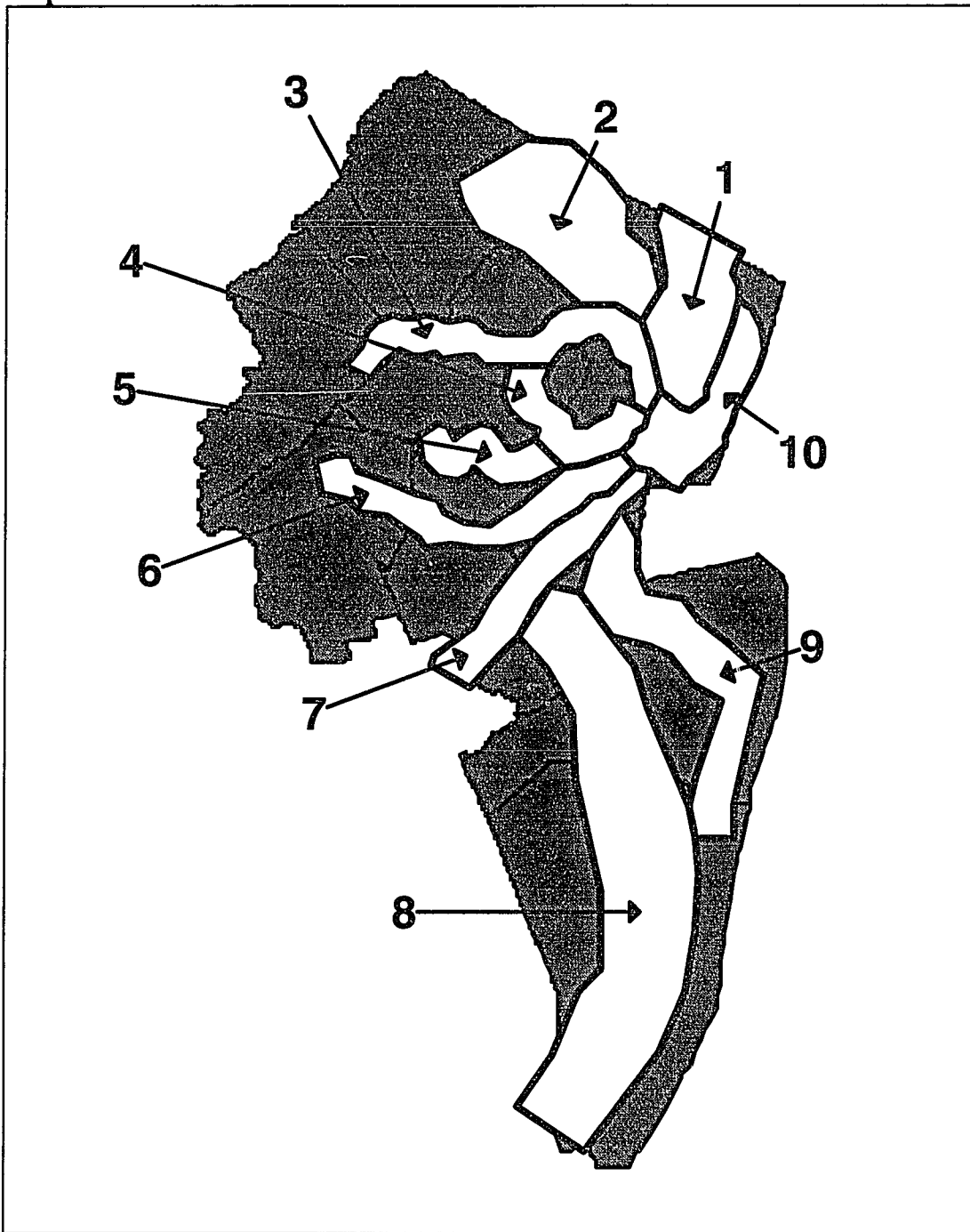
Two steps were used in order to extract the data connected to each corridor. First, the corridors were mapped. Second, the municipalities located within one corridor were

selected. The numerical characteristics of a corridor were derived from the combination of municipalities and the relevant demographic data.

MapInfo Software, a desktop mapping package, was used to map the corridors. Beginning with the NJ Transit rail map, corridors were drawn around the rail lines. Since the rail lines did not cover the entire region, two more corridors were drawn to include the remaining bus lines. In order to determine where to place the remaining corridors, a map of the bus network was displayed underneath the rail corridors. The remaining corridors were then drawn to encompass these bus lines. The final map (MAP 2) depicts the full ten corridors created. With the exception of a few small bus lines, the entire NJ Transit bus and rail network was included in at least one corridor. Corridor 2 and Corridor 9 covers the NJ Transit Bus routes, which were not included with the eight other Corridors. There are, however, two new rail lines planned, which would include Corridor 2 and Corridor 9.

Each corridor was analyzed by selecting two important geographic bits of information; bus routes traversing the corridor and municipalities within the boundaries of the corridor. In order to select bus routes for each corridor, the several steps needed to be taken. First, the bus routes were overlaid on the corridors map. Each corridor was then selected by choosing every bus route within the corridor. The final result was a map of the bus lines within the specific corridor. Each map was then saved separately, which enabled maps to be looked at separately on a corridor basis. To assess the number of buses in each corridor, the tables associated with the maps were scanned and manually counted, ensuring that only the unique bus route numbers were included. All possible routes (peak and offpeak) were mapped.

**Map 2** The Ten Transit Corridors Created



Created using the Mapinfo Desktop Mapping Package

For each municipality, the following information was available from the 1990

Census Transportation Planning Package (CTPP) introduced in Chapter 1:

- Total number of people who use all modes of transport (transit, car, bicycle, etc.).
- Total number of people who use some form of transit (bus, subway, commuter rail, etc.).
- Total number of people who use buses.
- Total number of people who use commuter rail.
- Total number of jobs within the municipality.
- Total number of people living within the municipality.

In addition to this information, two other numbers were calculated based on the 1990 CTPP. They are as follows:

- The number of people who use some type of transportation mode per thousand people.
- The number of people who use transit per thousand people.

This information provides a foundation for analyzing the ten corridors.

Information on both the amount of transit users and the number of jobs in the corridor gives a good indication of the number of people traveling in each corridor. The term “attracted” will be used in this chapter to refer to trips enroute to a specific corridor, while the term “produced” will refer to trips originating within the corridor.

In many cases, there was a significant difference between the population of a corridor and the number of commuters from the corridor. This difference can be attributed to segments of the population generally outside of the workforce, including children, the unemployed, telecommuters, non-working parents, and senior citizens.

The ten NJTPA regional corridors will be discussed in a counterclockwise rotation, starting in a twelve o'clock position and ending in a three o'clock position.

They are as follows:

- Corridor 1 - Bergen County
- Corridor 2 - Passaic/ Sussex
- Corridor 3 - Essex/ Passaic/ Morris/ Warren
- Corridor 4 - Essex/ Union/ Morris
- Corridor 5 - Western Union/ Morris/ Somerset
- Corridor 6 - Union/ Middlesex/ Somerset/ Hunterdon
- Corridor 7 - Eastern Union/ Middlesex
- Corridor 8 - Middlesex/ Monmouth/ Ocean (Inland Route)
- Corridor 9 - Middlesex/ Monmouth/ Ocean (Coast Route)
- Corridor 10- Hudson/ Newark

## **2.4 Corridor 1 - Bergen County**

The Bergen County corridor has three commuter rail lines, thirty-eight bus lines, and four major access roadways.

### **2.4.1 Rail Lines**

The three rail lines are NJ Transit's Main Line, Bergen Line, and Pascack Valley Line. These three lines are designed to transport residents of this corridor into Hoboken Terminal, where they can reach job sites in Hoboken, Jersey City, Midtown and Lower

Manhattan via the PATH. Only the Bergen and Main Lines have trains traveling in both directions all day, making it possible to travel between Hoboken Terminal and cities such as Clifton, Paterson, Ridgefield, Rutherford, Saddlebrook, and Fairlawn. The Pascack Valley Line is designed to operate only during rush hour. As a result, residents can only use this line to commute to cities like Hackensack if they live north of the city. This is due to the fact that trains only travel south to Hoboken Terminal during the morning rush hour. During the evening rush hour, the opposite takes place. Trains run in the northbound direction (Map 3).

#### **2.4.2 Bus Lines**

Of the thirty-eight bus lines, fifteen are Interstate and twenty-two are local routes.

##### **Interstate Routes:**

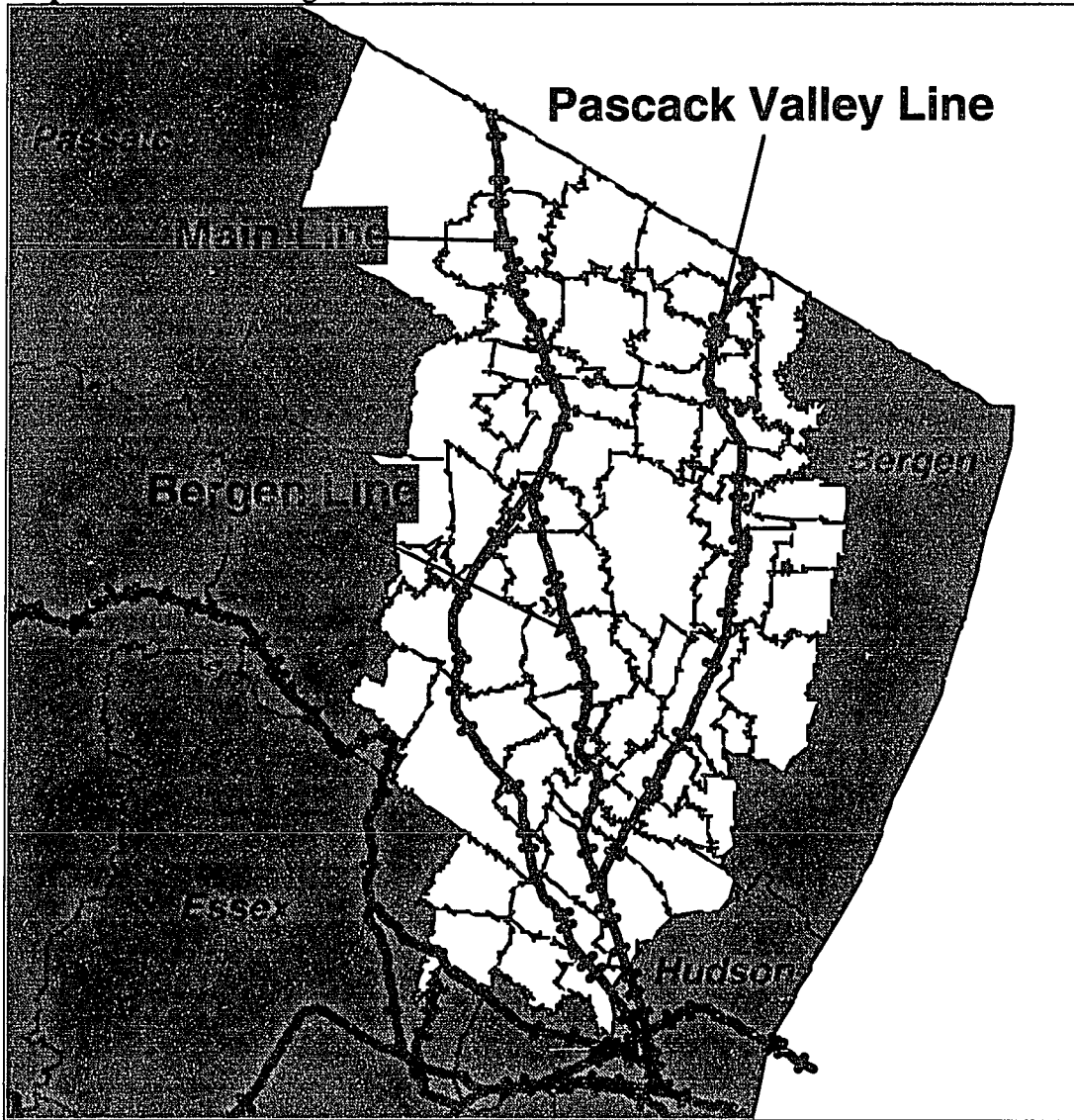
- Fourteen travel between Bergen County and Midtown Manhattan.
- One travels to the George Washington Bridge Bus Terminal.

##### **Local Routes:**

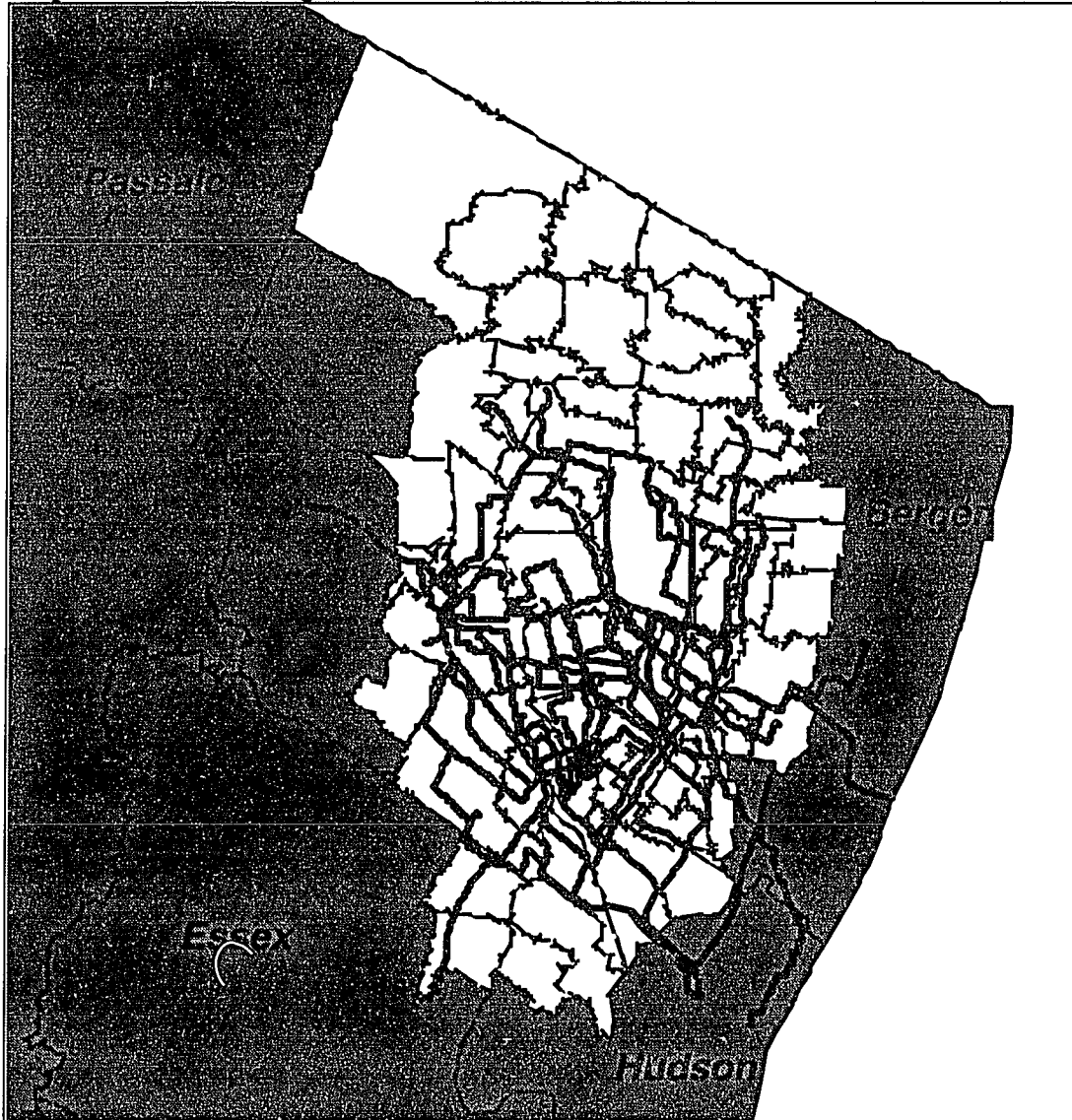
- Ten travel within Bergen County.
- Five travel between Bergen and Passaic Counties.
- Seven travel between Bergen County and other places such as Newark.

The above routes make it possible for travel between this corridor and Harlem, Midtown New York, Newark, lower Passaic County, and sites within Bergen County, such as Paramus and Hackensack. The most, however, are local bus routes which remain within Bergen County and Corridor 1. These buses cater to local trips for the residence of Bergen County (Map 4).

Map 3 Rail Lines Through Corridor 1



Created using the Mapinfo Desktop Software Package

**Map 4 Bus Lines Through Corridor 1**

Created using the MapInfo Desktop Mapping Package

### 2.4.3 Corridor Data Analysis

The following describes the information contained in Table 1 through Table 10.

**Total Population:** Total number of people (women and men) who live in the corridor.

**Total Transit Riders:** Total number of users of transit (bus and commuter rail).

**Total Commuters:** Total number of residents of the corridor which travel to work daily.



**Total Jobs:** Total number of jobs within the corridor.

**Commuters - Jobs:** Total number of people who will be expected to enter the corridor to reach job sites within the corridor.

**Jobs - Commuters:** Total number of people who will be expected to leave the corridor to reach jobs outside of the corridor.

**Comparison per Thousand:** Total number of commuters and transit riders per thousand.

**Table 1 Corridor 1 Analysis**

Total Population	855,608
<b>Total Transit Usage</b>	
Total Transit Riders	18,389
Bus	16,401
Commuter Rail	1,988
<b>Total Commuters Produced from Corridor</b>	
Total Commuters	472,600
Total Jobs	443,304
Commuters (including transit riders) - Jobs	<b>29,296*</b>
<b>Total Commuters Produced from Corridor Without Transit Riders</b>	
Commuters - Transit Riders	454,211
Total Jobs	443,304
Commuters (without transit riders) - Jobs	<b>10,907*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	552
Number of transit riders per thousand commuters	39

Source: New Jersey Census Transportation Planning Package, 1990

\*There were more commuters than jobs in both cases which meant that more trips were produced than attracted.

At least 29,296 corridor residents traveled to jobs outside Corridor 1. With the removal of transit riders, at least 10,907 corridor residents traveled to jobs outside Corridor 1. The travel pattern radiates symmetrically from the corridor to serve the 10,907 commuters. Major roads such as NJ 17, NJ 4, NJ 208, Garden State Parkway, and I-80 provide easy accessibility to the rest of the region and New York City. With the high

levels of transit service provided connecting Corridor 1 with Hoboken, Jersey City and New York City, the roadway network to these cities is probably not congested by commuters from Corridor 1.

## **2.5 Corridor 2 - Passaic/ Sussex**

The Passaic/ Sussex corridor has no commuter rail lines, six bus lines, and four major highways.

### **2.5.1 Rail Lines**

Even though there are no commuter rail lines, it should be mentioned that there is a planned commuter rail line which would serve Corridor 2. The rail line, known as the New York Susquehanna & Western (NYS&W), would connect with NJ Transit's Main Line and allow trains to travel from Sparta, New Jersey to the Hoboken Terminal. Currently, freight trains travel along the rail line. It is possible that commuter trains could use this line as well, however, there are safety issues in sharing the line with the freight traffic, that would have to be considered. Also, a commuter rail service might be limited to operating rush hour train service so as not to conflict with freight train movements, since there is only one track. The Pascack Valley Line would be a good example of service operating along one track and limited to rush hour service.

### **2.5.2 Bus Lines**

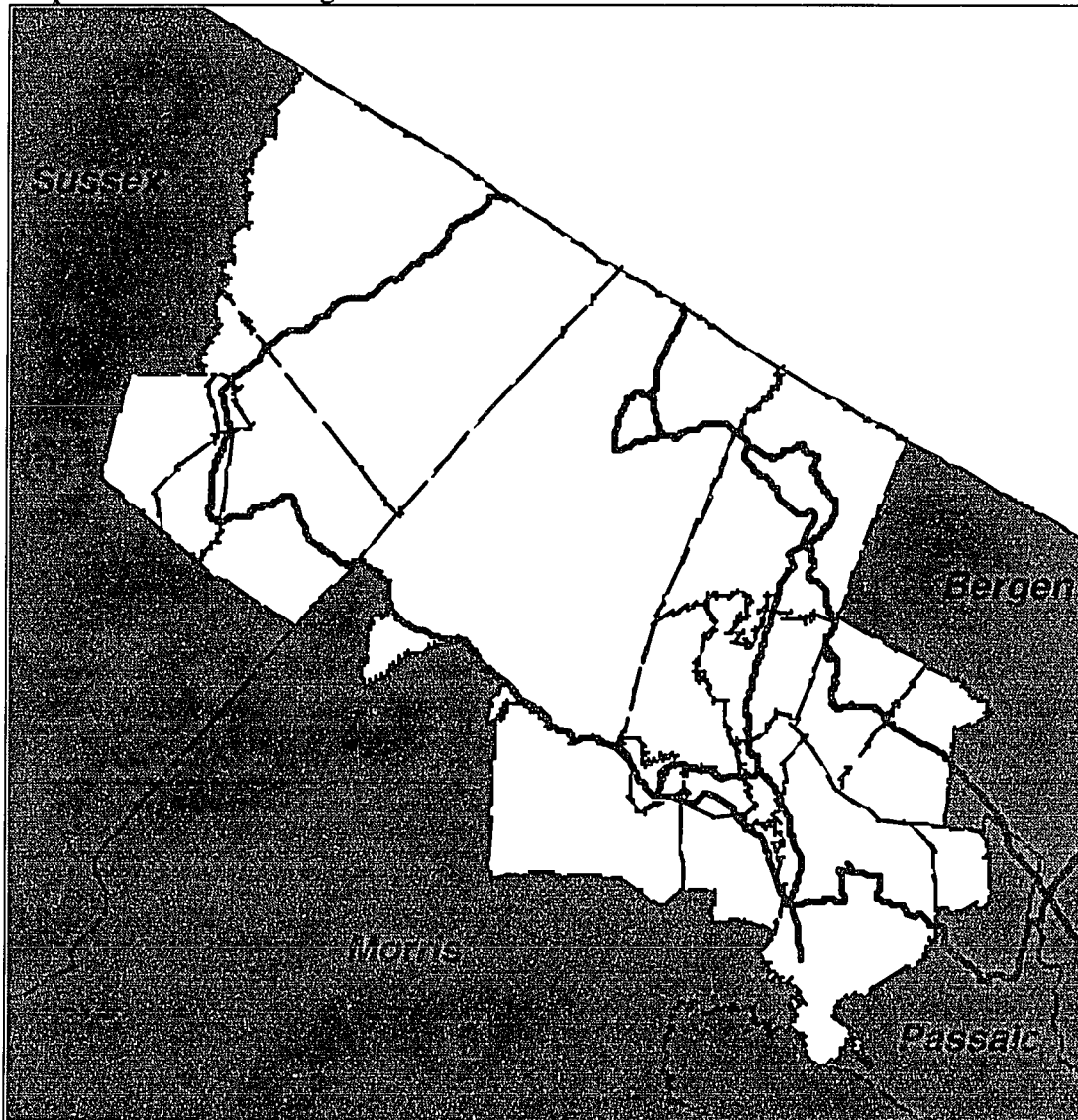
There are six bus lines, three interstate and three local (Map 5).

**Interstate:**

- Three travel between Passaic County and Midtown Manhattan.

**Local Routes:**

- Two travel to Passaic County.
- One travels between Passaic and Morris Counties.

**Map 5 Bus Routes Through Corridor 2**

Created using the MapInfo Desktop Mapping Package

### 2.5.3 Corridor Data Analysis

Table 2 summarizes the characteristics of Corridor 2. Since Corridor 2 has more jobs than commuters, the heading Jobs-Commuters refers to trips enroute to the corridor.

**Table 2** Corridor 2 Analysis

Total Population	288,232
<b>Transit Usage</b>	
Total Transit Riders	1,552
Bus	1,505
Commuter Rail	47
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	82,649
Total Jobs	114,719
Jobs - Commuters (including transit riders)	<b>32,070*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	81,097
Total Jobs	114,719
Jobs - Commuters (without transit riders)	<b>33,622*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	287
Number of transit riders per thousand commuters	19

Source: New Jersey Census Transportation Planning Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

Corridor 2 attracted at least 32,070 trips. The road network for the corridor does not access the rest of the North Jersey Interstate System very efficiently. US 202, NJ 23, NJ 94, and CO 511 are the major roads of Corridor 2. The major roads are two to four lane roads with traffic lights. I-287 cuts through the southern most section of Corridor 2. Since three quarters of the corridor are located far away from any interstate, I-287 can not be considered part of the Corridor 2 roadway system.

## **2.6 Corridor 3 - Essex/Passaic/Morris/Warren**

The Essex/ Passaic/ Morris/ Warren Corridor has two major commuter rail lines, twenty-three bus lines, and six major roadways.

### **2.6.1 Rail Lines**

Transit in the Essex/Passaic/Morris/Warren Corridor is focused on NJ Transit's Boonton Line. This line, like the Pascack Valley Line mentioned in Corridor 1, is designed for rush hour commuting to Hoboken, Jersey City, and New York via the PATH. In the morning, trains run eastbound to and in the evening westbound from the Hoboken Terminal. The station at Dover is the one exception along this line. Since this line joined up with the Morris & Essex line, this station has daily service.

The Montclair Branch of the Morris & Essex Line, is the other rail line which connects Montclair with Newark and Hoboken Terminal. Although this line is a rush hour only line, trains travel in both directions. This makes it possible to travel from Hoboken and Newark to jobs in Montclair, Bloomfield, and Glen Ridge (Map 6).

### **2.6.2 Bus Lines**

Of the twenty-three bus lines, six are interstate routes and seventeen are local routes.

Interstate Routes:

- Six bus travel between Corridor 3 and Midtown Manhattan.

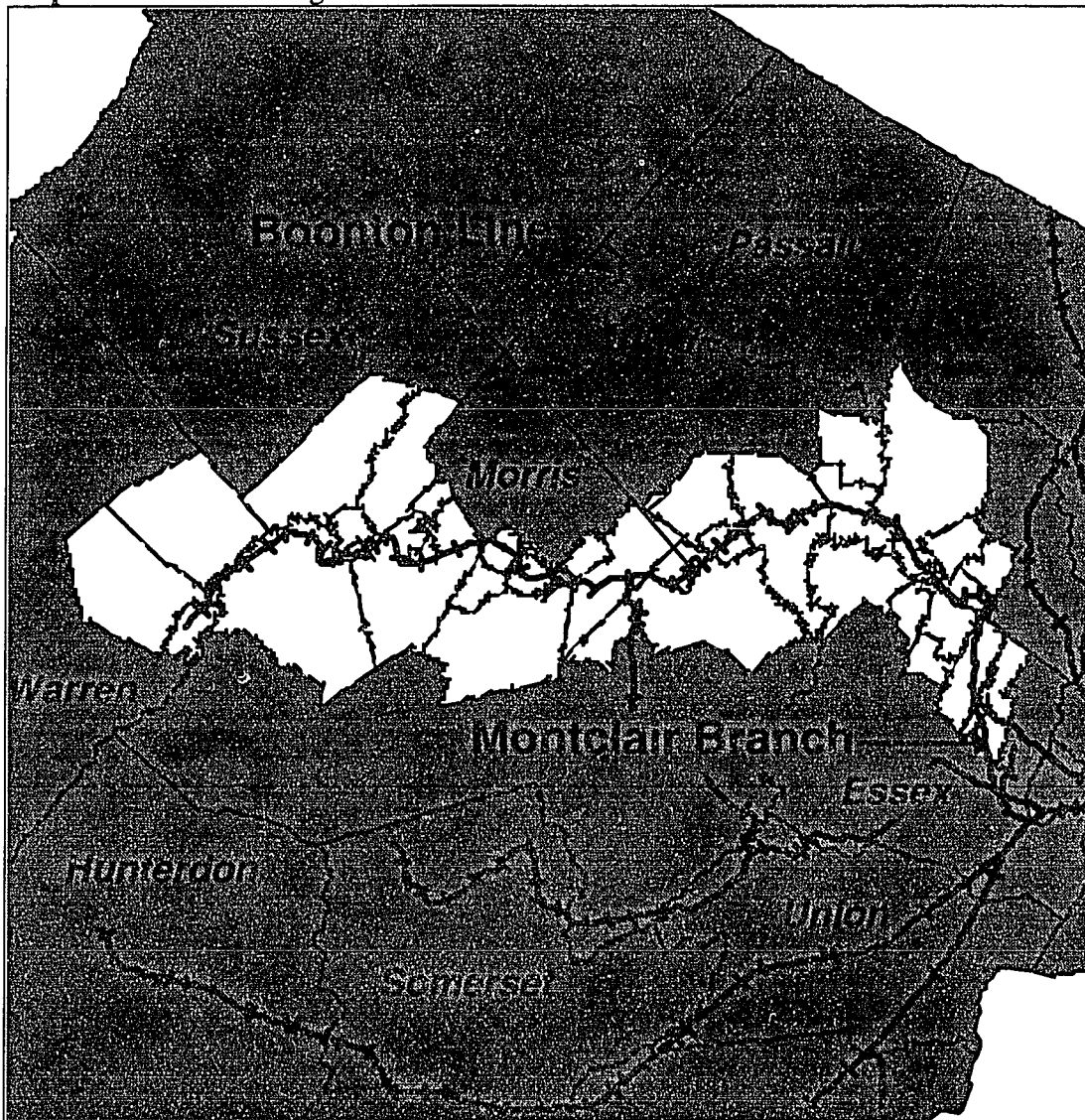
Local Routes:

- Five travel within Morris County.
- Two travel within Passaic County.

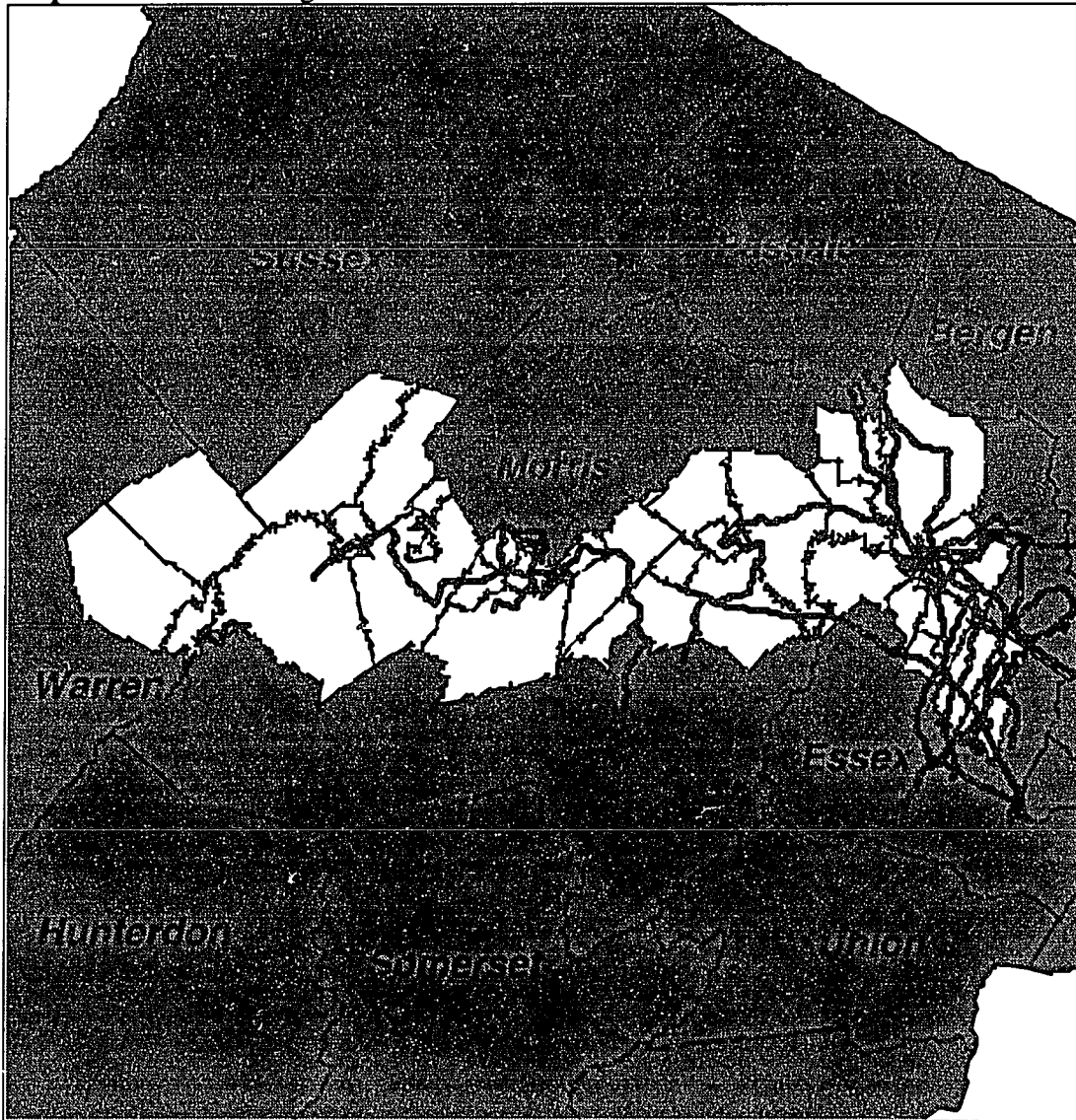
- Ten travel between Corridor 3 and other places such as Newark.

The bus network for the corridor focuses on three primary types of service. The first type of service is the New York commute from large park and rides. Intercounty bus routes connecting Passaic and Bergen or Passaic and Essex Counties are the second type of service. The third type of service is inter-county buses (Map 6).

**Map 6 Train Line Through Corridor 3**



Created using the MapInfo Desktop Mapping Package

**Map 7 Bus Lines Through Corridor 3**

Created using the MapInfo Desktop Mapping Package

### 2.6.3 Corridor Data Analysis

Table 3 contains the commuting information for Corridor 3. At least 63,742 people who lived outside were attracted to jobs in Corridor 3. If the number of transit riders were included, at least 57,374 were attracted to jobs within the corridor from points outside the corridor. This number is the least amount of commuters from outside the corridor.

**Table 3 Corridor 3 Analysis**

<b>Total Population</b>	514,787
<b>Transit Usage</b>	
Total Transit Riders	6,368
Bus	5,971
Commuter Rail	397
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	258,853
Total Jobs	316,227
Jobs - Commuters (including transit riders)	57,374*
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	252,485
Total Jobs	114,719
Jobs - Commuters (without transit riders)	63,742*
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	503
Number of transit riders per thousand commuters	25

Source: New Jersey Census Transportation Planning Package, 1990

\*The number of jobs exceeded commuters in both cases. The corridor attracted rather than produced more trips.

The highway network in this corridor accesses most of the urban areas such as New York, Newark, Paterson, Hackensack, and the I-287 corridor. Most of the commuters drive automobiles in this corridor. Routes such as I-80, I-287, US 202, NJ 10, NJ 23, and CO 506 criss-cross the corridor and access the region more efficiently than bus or commuter rail routes.

### **2.7 Corridor 4 - Essex/Union/Morris**

The Essex/ Union/ Morris Corridor has one major rail line, twenty-four bus lines and eight major roadways.



### **2.7.1 Rail Lines**

The Morristown Branch of the Morris & Essex Line serves Corridor 4. Service is provided from Dover to Hoboken Terminal via Summit and Newark on a daily basis. During the rush hour, service is provided between Hackettstown and Dover to Hoboken via Newark. Since service is provided on a daily basis between Dover and Hoboken, jobs in Morristown, Summit, Hoboken, Jersey City, and New York can be reached from any town along the line (Map 8).

### **2.7.2 Bus Lines**

There are twenty-four bus lines serving this corridor.

Interstate routes:

- Three travel between Corridor 3 and Midtown Manhattan.

Local Routes:

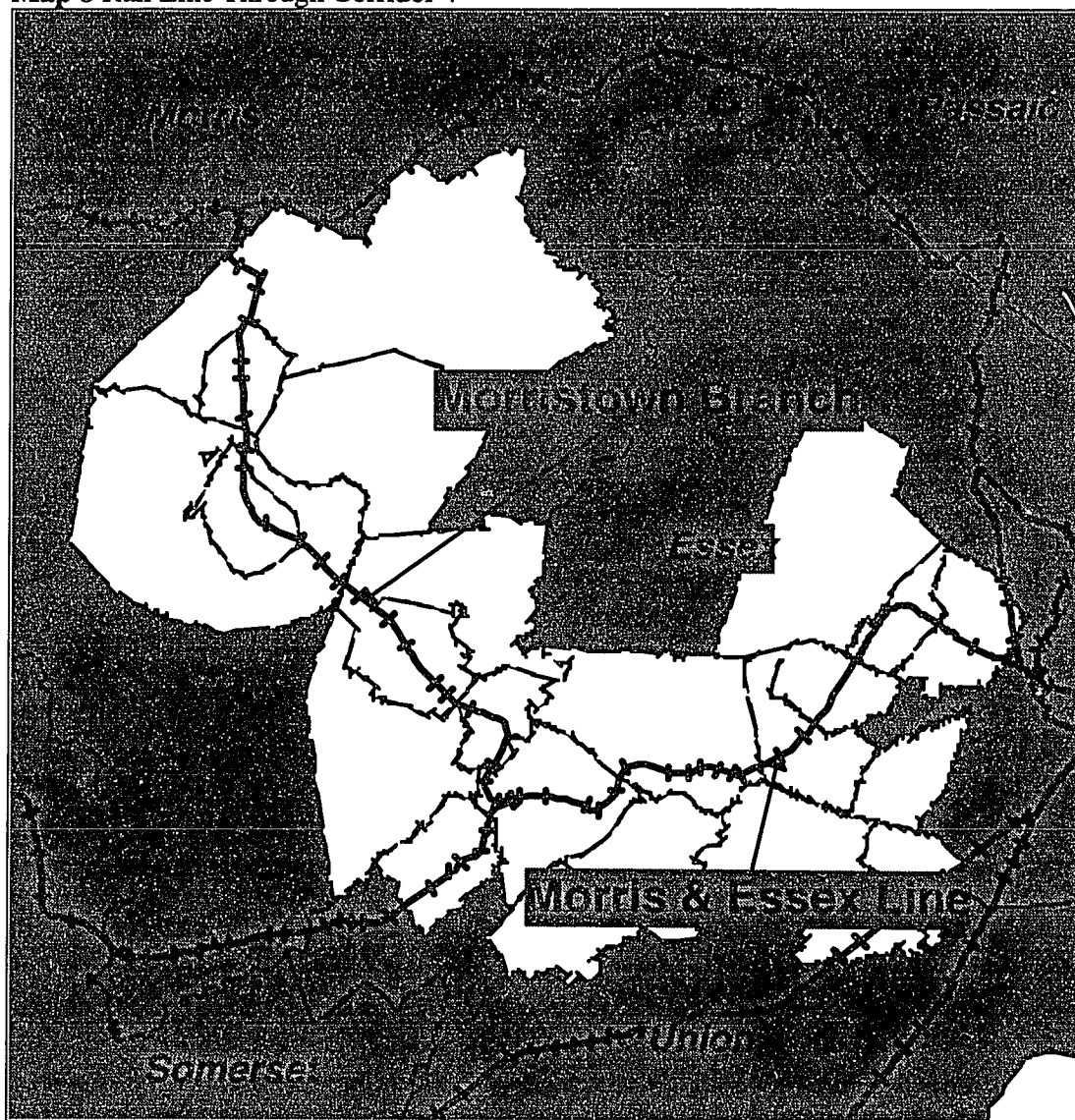
- Five travel within Morris county.
- Fifteen connect Morris, Essex, and Union counties.

It is interesting to note that one of the bus lines parallels the Morristown Branch of the Morris & Essex line between Summit and Dover (Map 9).

### **2.7.3 Corridor Data Analysis**

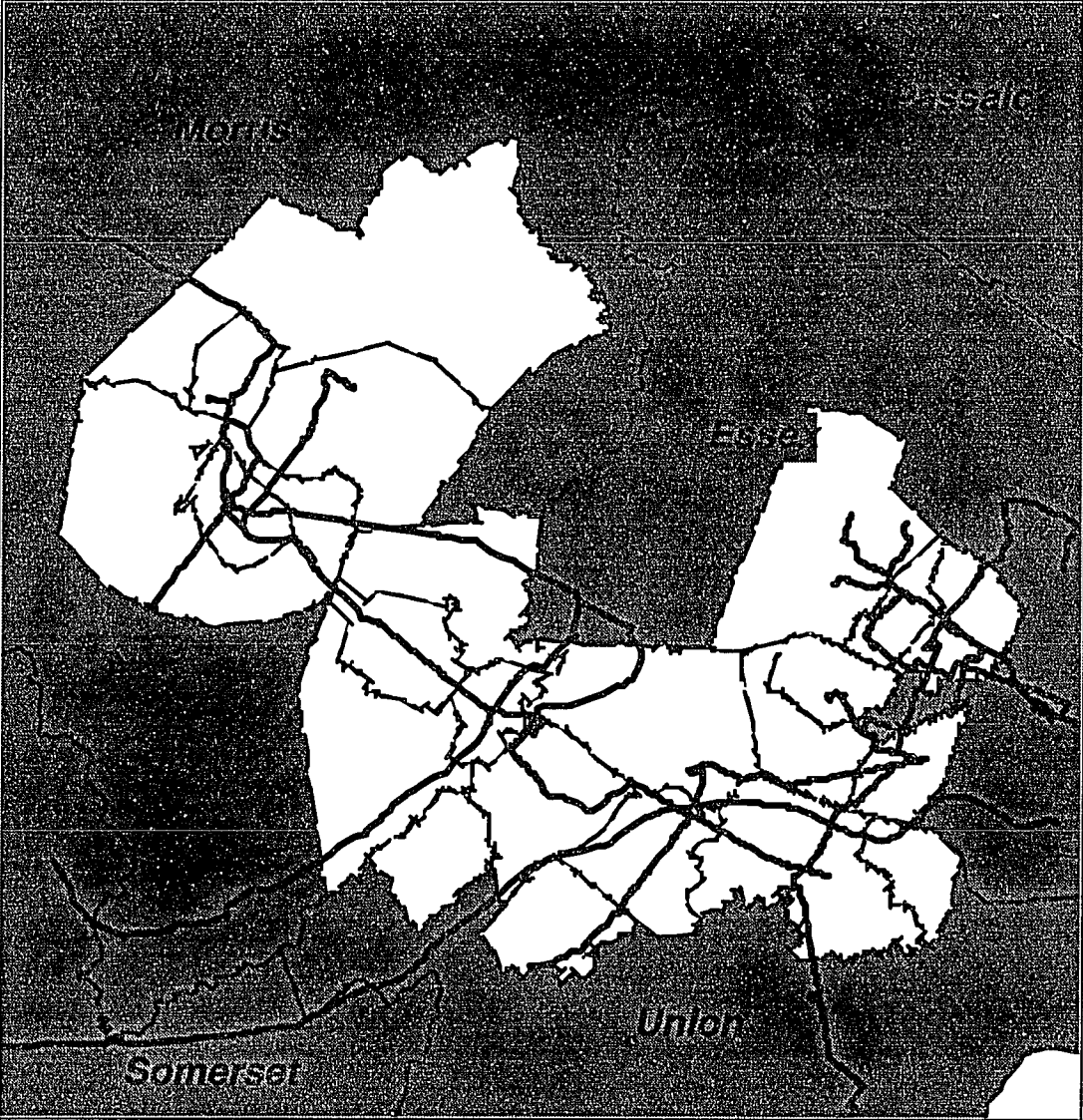
Table 4 contains the commuting information for Corridor 4. The number of trips produced by people who traveled to jobs within and from points outside the corridor was at least 24,811. If transit riders were included, the number was 11,773. There were more people attracted to than trips produced by Corridor 4.

**Map 8 Rail Line Through Corridor 4**



Created using the MapInfo Desktop Mapping Package

**Map 9 Bus Routes Through Corridor 4**



Created using the MapInfo Desktop Mapping Package

**Table 4 Corridor 4 Analysis**

<b>Total Population</b>	520,294
<b>Transit Usage</b>	
Total Transit Riders	13,038
Bus	11,195
Commuter Rail	1,843
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	310,998
Total Jobs	322,771
Jobs - Commuters (including transit riders)	<b>11,773*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	81,097
Total Jobs	114,719
Jobs - Commuters (without transit riders)	<b>24,811*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	598
Number of transit riders per thousand commuters	42

Source: New Jersey Census Transportation Planning Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

The road network serving the corridor is comprised of eight major roadways: I-78, I-280, I-287, US 202, NJ 10, NJ 24, NJ 124, and NJ 53. These roads primarily connect Morristown with Summit, Newark, and New York. This is the same route as the commuter rail line which serves Corridor 4. Only I-287 and US 202 cover a region not served by transit. When this road network is compared with the rail and bus routes, commuters chose to drive along routes which parallel the rail and bus routes.

### **2.8 Corridor 5 - Western Union/ Morris/ Somerset**

The Western Union/ Morris/ Somerset Corridor has one major rail line, one bus line, and four major roadways.

### **2.8.1 Rail Lines**

The Gladstone Branch of the Morris & Essex Line serves this rural corridor. This rail line operates daily between Gladstone in Somerset County and the Hoboken Terminal via Summit and Newark. Jobs in towns such as Peapack, Millington, and Barnardsville can be reached at any time of the day from Hoboken, Newark, and Summit. The Gladstone Branch is a suitable area if a corporation is considering relocation to a region easily accessible by transit and with an adequate amount of land. Trains from Newark and Hoboken travel to this region via Summit on a daily basis. During most of the day, trains express from Newark to this region on an hourly basis, thus providing quick service between Hoboken and Newark and the Gladstone Branch stations (Map 10) .

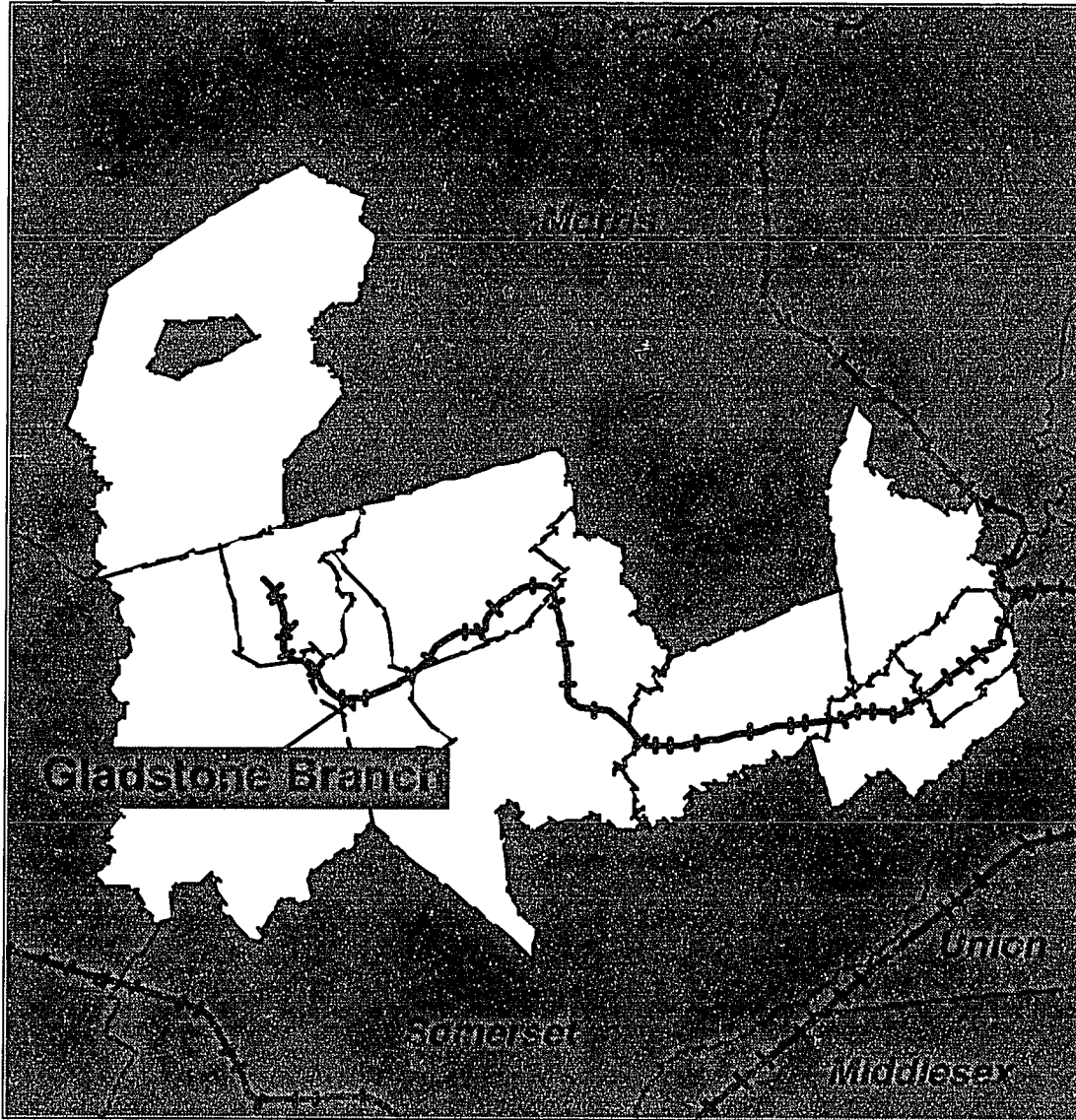
### **2.8.2 Bus Lines**

There is one bus line serving this corridor. It is the Morris County bus line which connects Somerset County with Morris County. The bus line operates on a route perpendicular to the rail line, passengers who use the rail line could easily transfer to the bus to reach destinations north and south of the Gladstone Branch. Since this region is very rural, the rail line provides enough service to cater to this region (Map 11).

### **2.8.3 Corridor Data Analysis**

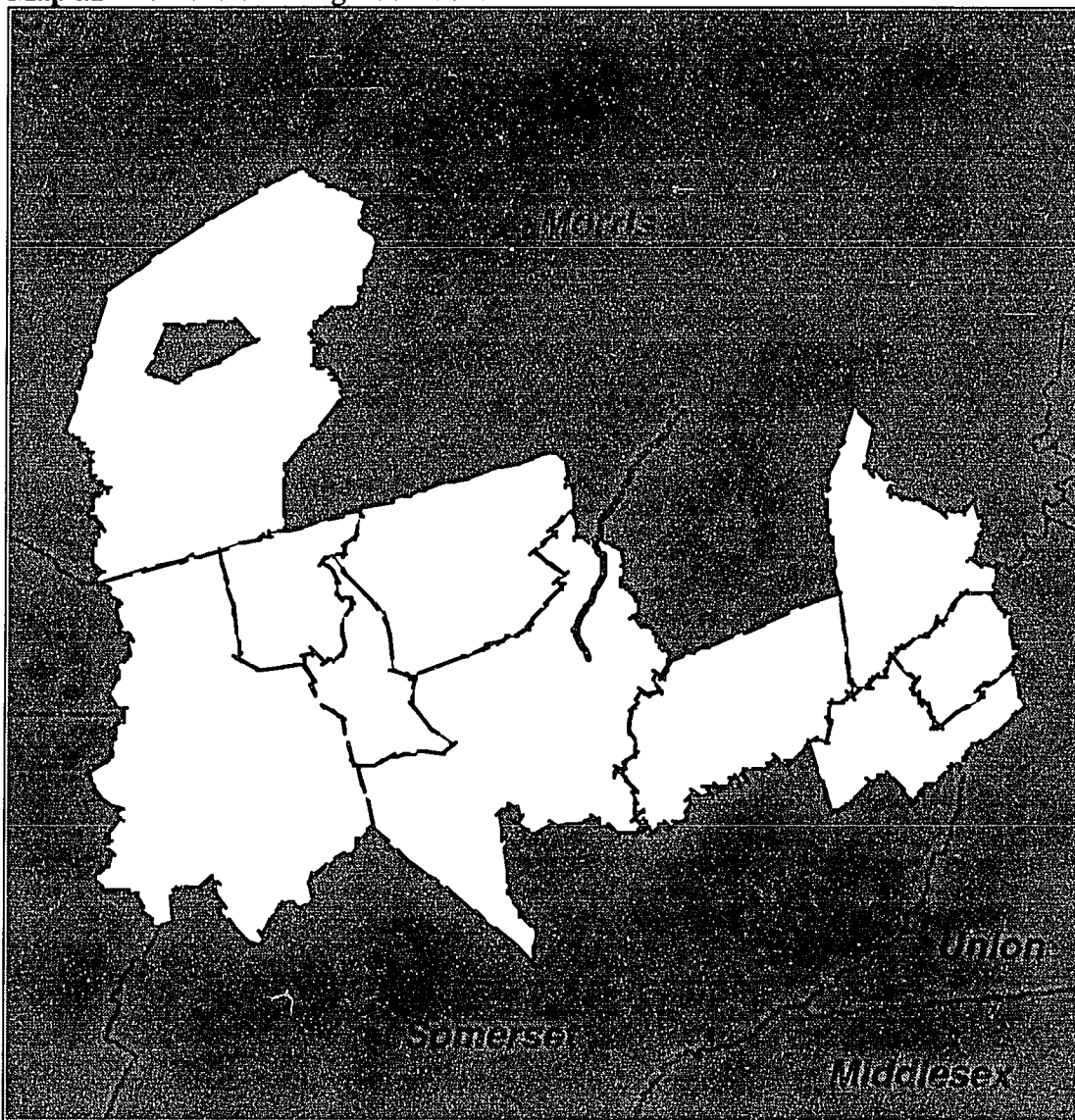
Table 5 contains the commuting information for Corridor 5. There were at least 10,144 commuters in the corridor from points outside. With the subtraction of transit riders. Most of these commuters were enroute to Hudson County and Manhattan. The number was reduced to at least 10,588 trips attracted to Corridor 5.

**Map 10 Train Line Through Corridor 5**



Created using the MapInfo Desktop Mapping Package

**Map 11 Bus Routes Through Corridor 5**



Created using the MapInfo Desktop Mapping Package

**Table 5 Corridor 5 Analysis**

Total Population	127,595
<b>Transit Usage</b>	
Total Transit Riders	444
Bus	237
Commuters Rail	207
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	42,173
Total Jobs	52,317
Jobs - Commuters (including transit riders)	<b>10,144*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	41,729
Total Jobs	52,317
Jobs - Commuters (without transit riders)	<b>10,588*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	331
Number of transit riders per thousand commuters	11

Source: New Jersey Census Transportation Planning Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

The roadway network for the corridor consists of three major routes and one minor route. I-78, US 202, and US 206 are the major routes, and CO 512 is the minor route. The county route runs down through the center and the other three routes run along the periphery of the corridor.

## **2.9 Corridor 6 - Union/ Middlesex/ Somerset/ Hunterdon**

The Union/ Middlesex/ Somerset/ Hunterdon/ Corridor has one major rail line, ten bus lines, and three major routes.

### **2.9.1 Rail Line**

NJ Transit's Raritan Valley Line serves this corridor. The line connects High Bridge,



Somerville, Plainfield, and Cranford with Newark. Hoboken, Jersey City, and New York are accessible via connections in Newark. The Raritan Valley Line runs daily between Raritan and Newark, but only rush hour service is available between Raritan and High Bridge. Jobs in Somerville, Plainfield, and Cranford are accessible from Newark and New York by this line (Map 12).

**Map 12** Rail Line Through Corridor 6



Created using the MapInfo Desktop Mapping Package

### 2.9.2 Bus Lines

There are ten bus lines, four are interstate and six are local.

#### Interstate Routes:

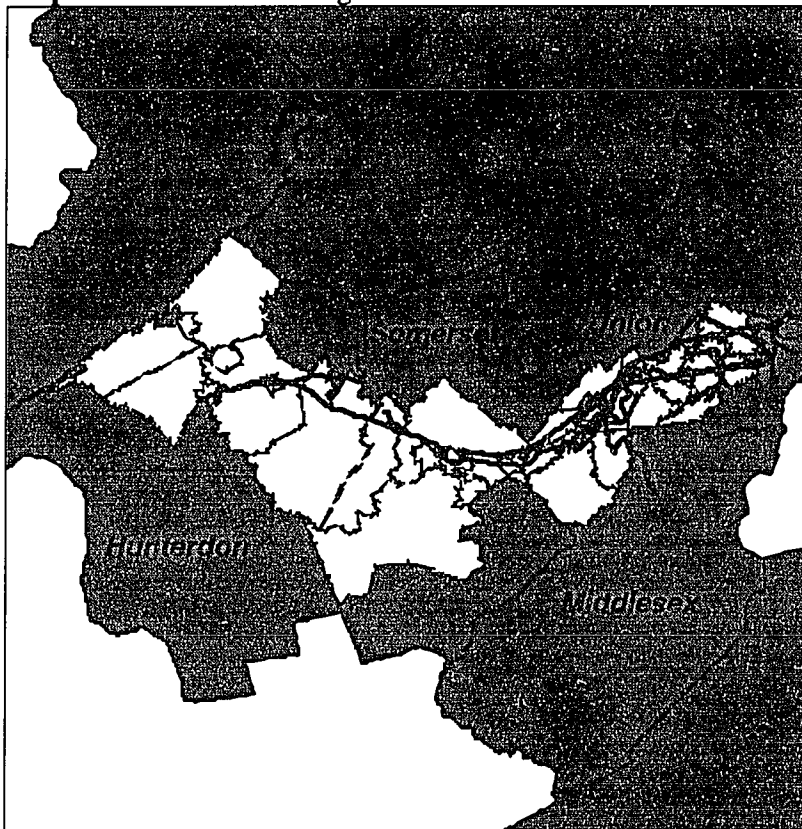
- Ten travel between Somerville, the Route 22 corridor, and Midtown Manhattan.

#### Local Routes:

- Five travel between Somerset, Union, Essex, and Middlesex Counties.
- One travels within Middlesex county.

The interstate bus routes parallel the Raritan Valley line. The local routes connect Corridor 6 with Newark.

**Map 13** Bus Routes Through Corridor 6



Created using the MapInfo Desktop Mapping Package

### 2.9.3 Corridor Data Analysis

Table 6 contains the commuting information for Corridor 6. At least 41,684 trips were attracted to from points outside the corridor. If the transit riders were included, then the number of trips attracted into Corridor 6 was at least 36,566.

**Table 6 Corridor 6 Analysis**

Total Population	517,755
<b>Transit Usage</b>	
Total Transit Riders	5,118
Bus	4,127
Commuter Rail	991
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	261,191
Total Jobs	297,757
Jobs - Commuters (including transit riders)	<b>36,566*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	256,073
Total Jobs	297,757
Jobs - Commuters (without transit riders)	<b>41,684*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	504
Number of transit riders per thousand commuters	20 <sup>a</sup>

Source: New Jersey Census Transportation Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

The roadway network for the region includes three major roads, I-78, US 22, and NJ 28. These roads all follow the Raritan Valley line to Newark. The location of the roads means that bus routes run parallel to the line. The I-287 and US 202 corridors are easily accessible from the corridor.

<sup>a</sup> Since this corridor has numerous transit runs to Newark and New York, either residents of the corridor work elsewhere, or they choose to drive to Newark and New York.

## **2.10 Corridor 7 - Eastern Union/Middlesex**

The Eastern Union/ Middlesex Corridor has one major rail line, eighteen bus lines, and five major roadways.

### **2.10.1 Rail Line**

NJ Transit's Northeast corridor line is the focus of Corridor 7. The rail line operates on a daily basis, making it possible to reach job sites in New Brunswick, Metuchen, Metropark, Rahway, Linden, and Elizabeth from Newark, New York, or any of the towns previously mentioned. This line also connects Trenton to all of the above mentioned cities, enabling commuters to live in Trenton and work within this corridor. A positive feature for living along this line is the direct service from any of its stations to Midtown Manhattan (Map 13).

### **2.10.2 Bus Lines**

Of the eighteen bus routes, seven are interstate and eleven are local routes.

Interstate Routes:

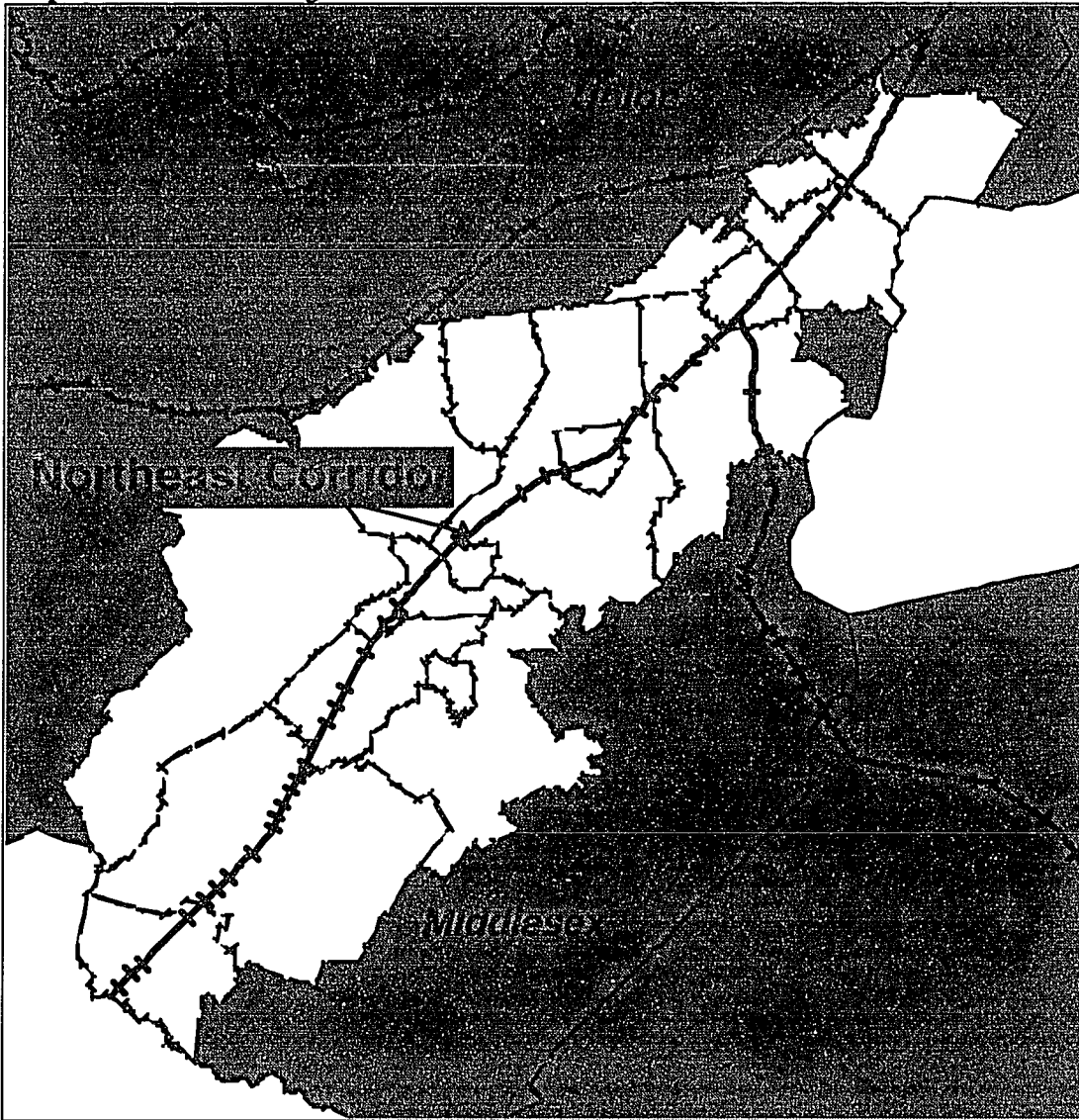
- Seven travel between Corridor 7 and Midtown Manhattan.

Local Routes:

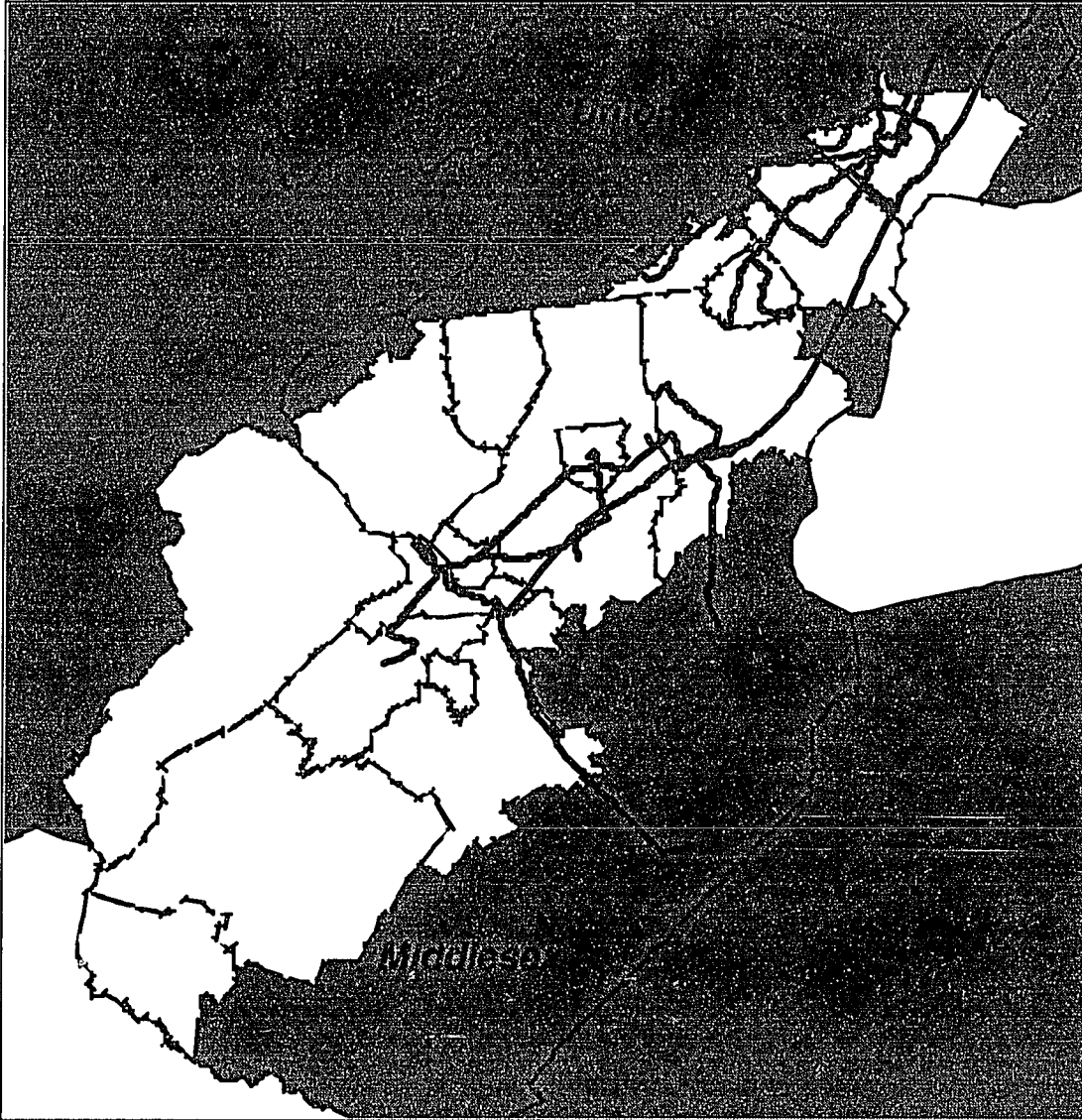
- Six travel within Middlesex County all originating from New Brunswick.
- Five travel between Elizabeth and points in Union County.

The local bus routes provide connecting service from the Northeast Corridor stations of Elizabeth and New Brunswick to surrounding towns. There are also bus service from Metropark to the Menlo Park and Woodbridge Malls (Map 15).

**Map 14** Rail Line Through Corridor 7



Created using the MapInfo Desktop Mapping Package

**Map 15 Bus Routes Through Corridor 7**

Created using the MapInfo Desktop Mapping Package

### **2.10.3 Corridor Data Analysis**

Table 7 contains the commuting information for Corridor 7. 134,156 trips were attracted to Corridor 7 from points outside. If all the transit riders worked in Corridor 7, then the number of trips attracted was reduced to 124,141. This figure surpasses any other corridor figure by almost 90,000.

**Table 7 Corridor 7 Analysis**

<b>Total Population</b>	830,055
<b>Transit Usage</b>	
Total Transit Riders	10,015
Bus	7,874
Commuters Rail	2,141
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	406,215
Total Jobs	530,356
Jobs - Commuters (including transit riders)	<b>124,141*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	356,200
Total Jobs	530,356
Jobs - Commuters (without transit riders)	<b>134,156*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	489
Number of transit riders per thousand commuters	25

Source: New Jersey Census Transportation Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

The roadway network for the corridor includes the New Jersey Turnpike, US 1, US 130, NJ 27, and NJ 18. It is not surprising that all five of these roads are heavily congested on a daily basis during rush hour. The majority of the corporate parks are located just outside of the cities, making transit less efficient for Corridor 7.

### **2.11 Corridor 8 - Middlesex/Monmouth/Ocean (Inland Route)**

The Middlesex/ Monmouth/ Ocean Corridor does not have a commuter rail line, but it has twenty-two bus routes, and two major roadways.

#### **2.11.1 Rail Line**

Unlike Corridor 2, this corridor does not have a rail line. Corridor 8 had been studied for

a future rail line using an existing freight line, like Corridor 2. The rail line called the Middlesex Ocean Monmouth Line (MOM), would connect such towns as Jamesburg, Freehold, and Lakeview with the Northeast corridor line cities. With the construction of the rail line, it would be possible to travel from Jamesburg, Freehold, and Lakeview to Newark and New York. As was the case in Corridor 2 with the NYS&W Line, only one track exists; therefore, all day service in both directions would not be possible. Instead, rush hour service could be provided.

### **2.11.2 Bus Lines**

Of the twenty-two bus lines, seven are interstate and fifteen are local routes.

Interstate Routes:

- Seven travel between Corridor 8 and Midtown Manhattan.

Local Routes:

- Three travel between Middlesex, Monmouth, and Ocean counties
- Eight routes travel within Ocean County.
- Four routes travel within Middlesex County.

The bus routes connect the major towns with Newark and New York. The local bus routes connect the surrounding countryside with Freehold, Red Bank, and Lakewood. MOM could provide a rail alternative to increase the transit modes share in its target market (Map 16).

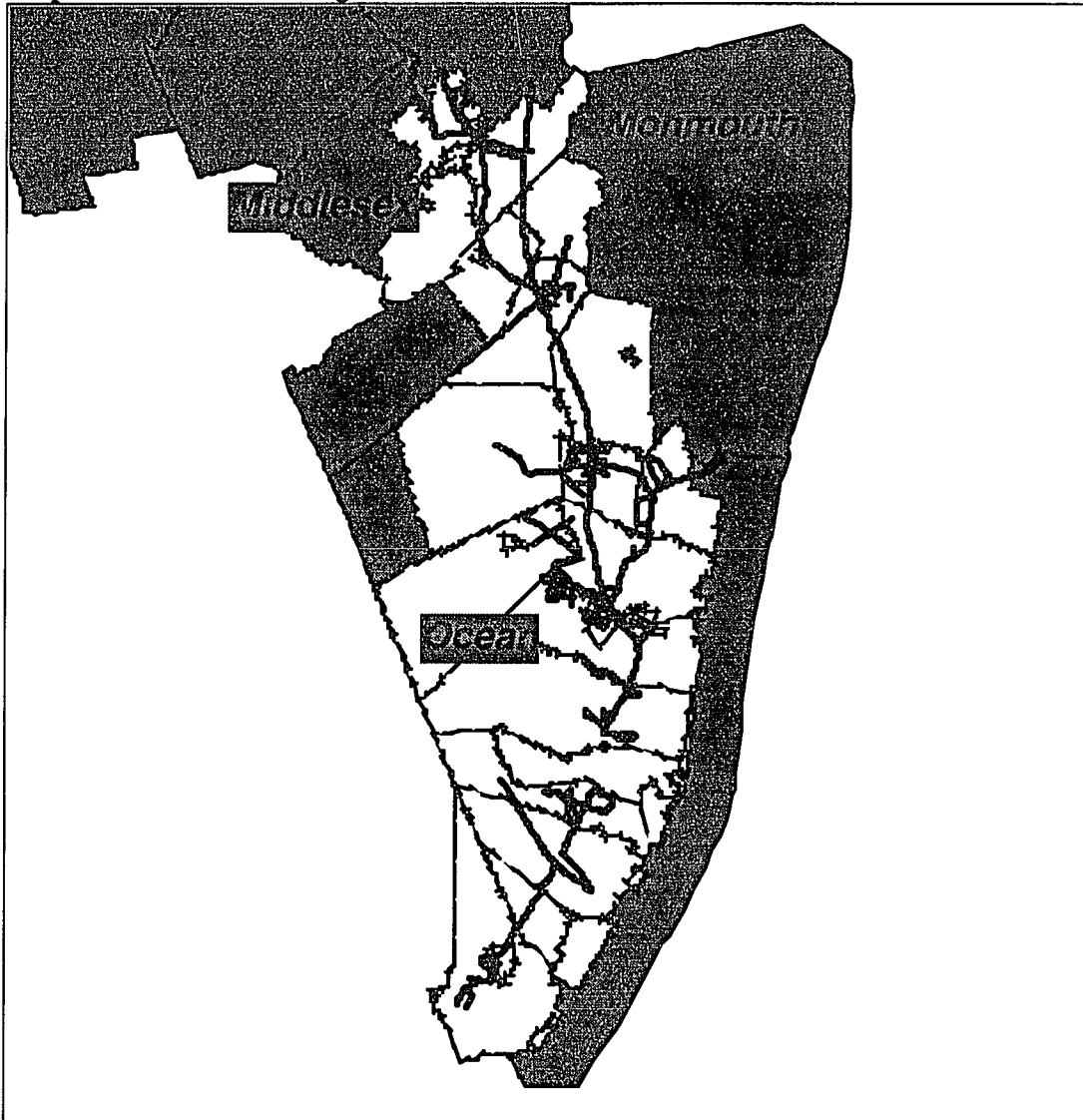
### **2.11.3 Corridor Data Analysis**

Table 8 contains the commuting information for Corridor 8. At least 134,502 trips were



attracted from points outside Corridor 8. If the transit riders were enroute to jobs within Corridor 8, than at least 133,163 trips were attracted from points outside of the corridor. This is a higher number than for Corridor 7, indicating that many of the roads in the area

**Map 16** Bus Routes Through Corridor 8



Created using the MapInfo Desktop Mapping Package

are highly congested. This corridor is also very long. It may be concluded that 133,163 trips have been entering the corridor from the many interstate, state, and county access roads.

**Table 8 Corridor 8 Analysis**

Total Population	986,976
<b>Transit Usage</b>	
Total Transit Riders	1,339
Bus	1,253
Commuter Rail	86 <sup>b</sup>
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	198,833
Total Jobs	331,996
Jobs - Commuters (including transit riders)	<b>133,163*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	197,494
Total Jobs	331,996
Jobs - Commuters (without transit riders)	<b>134,502*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	201 <sup>c</sup>
Number of transit riders per thousand commuters	7

Source: New Jersey Census Transportation Planning Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

The corridor has two major roads that ran down the center, US 9 and the Garden State Parkway. The two roads form a spine which the residents can utilize when traveling around the corridor. Since these are the primary roads for the corridor, they are also subject to heavy congestion during rush hour. The only alternative routes are back roads.

<sup>b</sup> The rail users either drove to NJ Transit's Northeast Corridor Line or to the North Jersey Coast Line, an average of at least three miles from the closest municipality to Corridor 8.

<sup>c</sup> Corridor 8 had a very low percentage of commuters compared to the total population, and appears to have large number of children, senior citizens, unemployed, non-working parents and telecommuters.

## **2.12 Corridor 9 - Middlesex/Monmouth/Ocean (Coast Route)**

The Middlesex/ Monmouth/ Ocean Corridor has one major rail line, twenty-three bus lines, and five major roadways.

### **2.12.1 Rail Line**

NJ Transit's North Jersey Coast line services Corridor 9. The rail line connects Long Branch, Red Bank, Matawan, and the Amboy's with Newark and New York. Similar to the Northeast Corridor line, this line has daily and direct service between Long Branch and Midtown Manhattan. The line has a daily service which connects coastal towns such as Point Pleasant, Belmar, and Asbury Park with Newark. Corridor 9 has a feasible means of reaching job sites in cities all along the line. However, commutes from these towns are required to transfer at Newark if their final destination is New York (Map 17).

### **2.12.2 Bus Lines**

There are twenty-three bus routes, eleven are interstate routes and twelve are local routes.

Interstate Routes:

- All eleven of the interstate routes travel into Midtown Manhattan.

Local Routes:

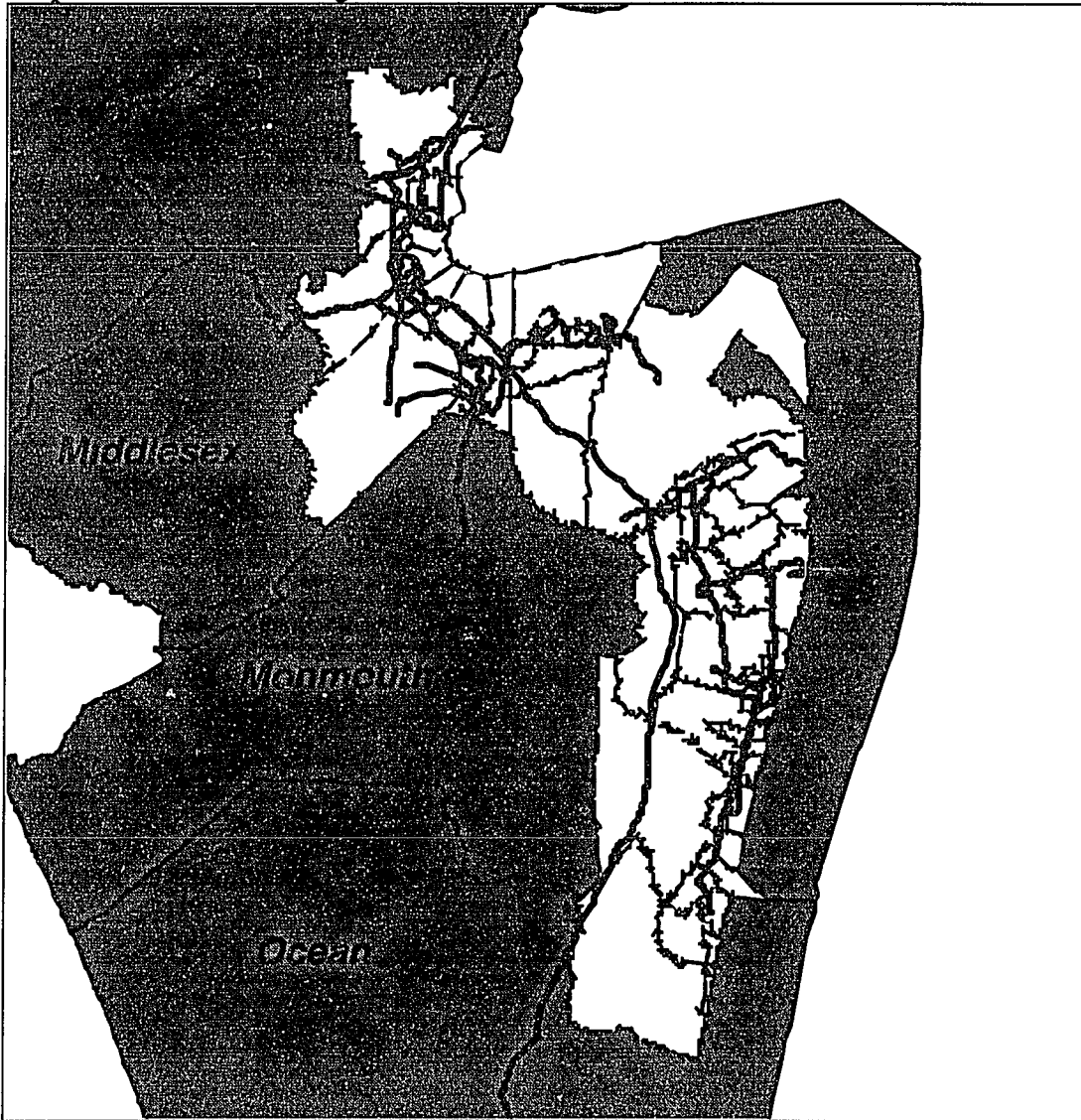
- Nine travel within Monmouth County.
- Three connect Monmouth County with Middlesex and Ocean Counties.

The interstate routes parallel the Coast Line train, while the local routes connect smaller towns with the Coast Line train stations. Many of the local routes serviced the Monmouth and Ocean County Beaches. (Map 18).

Map 17 Rail Line Through Corridor 9



Created using the MapInfo Desktop Mapping Package

**Map 18 Bus Routes Through Corridor 9**

Created using the MapInfo Desktop Mapping Package

### 2.12.3 Corridor Data Analysis

Table 9 contains the commuting information for Corridor 9. At least 56,776 trips were attracted from points outside of the corridor. If transit commuters were enroute to jobs within the corridor, than 53,664 trips were then attracted from outside the corridor.

**Table 9 Corridor 9 Analysis**

<b>Total Population</b>	792,541
<b>Transit Usage</b>	
Total Transit Riders	3,112
Bus	2,174
Commuter Rail	752
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	279,610
Total Jobs	333,274
Jobs - Commuters (including transit riders)	<b>53,664*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	276,498
Total Jobs	333,274
Jobs - Commuters (without transit riders)	<b>56,776*</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	353 <sup>d</sup>
Number of transit riders per thousand commuters	11

Source: New Jersey Census Transportation Planning Package, 1990

\*There were more jobs than commuters in both cases resulting in the corridor attracting more trips than it was producing.

The road network includes NJ 34, NJ 35, NJ 36 NJ 71, and the Garden State Parkway. These roads parallel each other between the Ocean/Monmouth border and the Raritan River Crossings. Congestion along any one of these routes can be relieved by the use of a parallel route located only a couple miles east or west of the congested route.

### **2.13 Corridor 10 - Hudson/ Newark**

Corridor 10 has every rail line mentioned in the description of Corridors 1 through 9 as well as two additional subway lines. Twelve major roadways and 104 bus lines also make up this corridor. Since all of the rail lines and access points to Manhattan pass

<sup>d</sup> Perhaps there were a significant number of children, senior citizens, unemployed, non-working parents, and telecommuters in the corridor based on the 1990 census data.

through the corridor, Corridor 10 can also be called the Northern New Jersey Urban Core Corridor.

### **2.13.1 Rail Lines**

Ten rail lines pass through Corridor 10. Three of them travel between Newark and Midtown Manhattan. The remaining seven lines travel from Newark to Hoboken. In addition to the ten commuter rail lines, there are two subway lines. One subway line, NJ Transit's Newark City Subway, travels within Newark. The Port Authority Trans-Hudson (PATH) is the other subway line, operated by the Port Authority of NY&NJ. Together, the two subway lines connect Newark with Jersey City, Hoboken, and Midtown and Lower Manhattan. The two subway lines also provide links between the commuter rail network and job sites in the corridor (Map 19).

### **2.13.2 Bus Lines**

There are 104 bus lines within the corridor with fifty-three interstate buses and fifty-one local bus routes.

#### **Interstate Routes:**

- Forty-five travel through the Lincoln Tunnel to the Port Authority Bus Terminal.
- Seven travel across the George Washington Bridge to the George Washington Bridge Bus Terminal.
- One travels through the Holland Tunnel into Lower Manhattan.

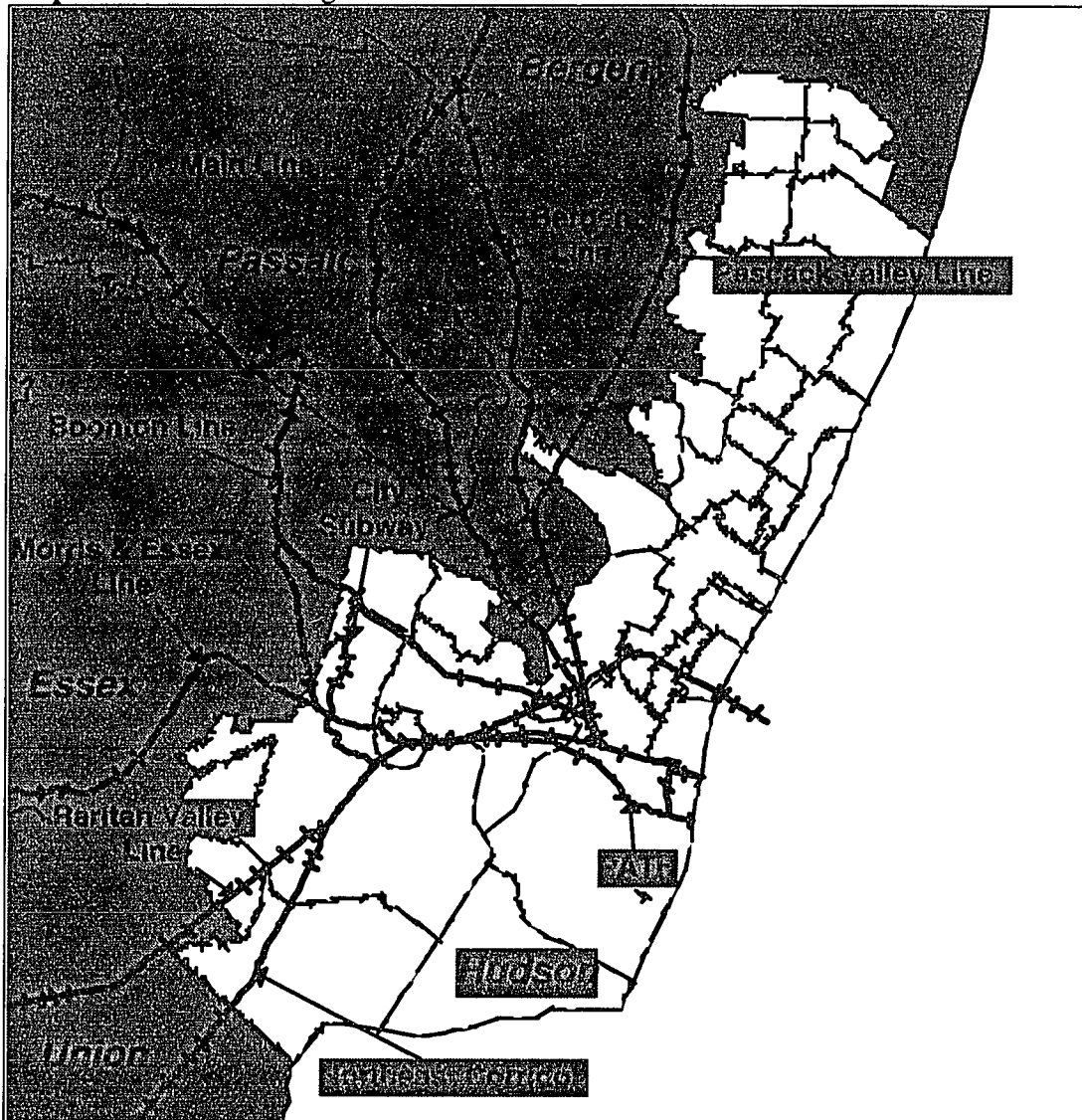
#### **Local Routes:**

- Thirty-eight travel between Hudson, Bergen, and Essex counties.

- Eight travel between points in Bergen, Essex, and Hudson counties to the Meadowlands Sports Complex.
- Five buses are Bergen County routes, which remain within the county.

The bus network for this corridor is primarily designed to move people into Manhattan or to Newark, Jersey City, and Hoboken. Each of these cities has bus terminals, making them bus hubs for the region (Map 20).

**Map 19 Rail Lines Through Corridor 10**



Created using the MapInfo Desktop Mapping Package



**Map 20 Bus Routes Through Corridor 10**

Created using the MapInfo Desktop Mapping Package

### 2.13.3 Corridor Data Analysis

Table 10 contains the commuting information for Corridor 10. The road network for the corridor includes the New Jersey Turnpike, I-78, US 1&9, US 1 truck, US 9W, NJ 4, NJ 495, NJ 169, NJ 440, CO 501, CO 505, and the Palisades Interstate Parkway. These roads connect the corridor with New York, and suburban northern New Jersey.

**Table 10 Corridor 10 Analysis**

<b>Total Population</b>	1,294,930
<b>Transit Usage</b>	
Total Transit Riders	81,619
Bus	57,347
Commuter Rail	11,206
<b>Total Commuters Attracted to Corridor</b>	
Total Commuters	592,521
Total Jobs	536,316
Commuters (including transit riders) - Jobs	<b>56,205*</b>
<b>Total Commuters Attracted to Corridor Without Transit Riders</b>	
Commuters - Transit Riders	510,902
Total Jobs	530,356
Jobs - Commuters (without transit riders)	<b>19,454**</b>
<b>Comparison Per Thousand</b>	
Number of commuters per thousand people	458 <sup>e</sup>
Number of transit riders per thousand commuters	138

Source: New Jersey Census Transportation Package, 1990

\*There were more commuters than jobs resulting in the corridor producing more trips than it was attracting.

\*\*There were more jobs than commuters resulting in the corridor attracting more trips than it was producing.

A relatively low number, 458 out of every one thousand, of residents of this corridor commuted. This number reflects the effects of the five non-commuting cases mentioned in the beginning of the chapter. Corridor 10 has the highest transit usage, not surprisingly, since the greatest number of transit alternatives are offered for Corridor 10.

## 2.14 Concluding Remarks

This chapter grouped the entire NJ Transit bus and rail system, within the NJTPA region, into ten corridors. In all cases, with the exception of two, the corridors attracted

<sup>e</sup> Of the 458 people who commuted, 63 of them were transit users.

more trips than they produced. Over 100,000 trips were attracted from Corridor 7 and Corridor 8. This was a significant number, since the remaining corridors averaged 29,971 trips attracted. The average for all ten corridors was 50,843 trips attracted. The flow of trips through the NJTPA region were observed in Chapter 2. Chapter 2 provided a thorough analysis of ten corridors in the NJTPA region based on rail and bus line data. Chapters 4 and 5 examined the origin and destination flows based on data relating to municipalities rather than corridors .

## **CHAPTER 3**

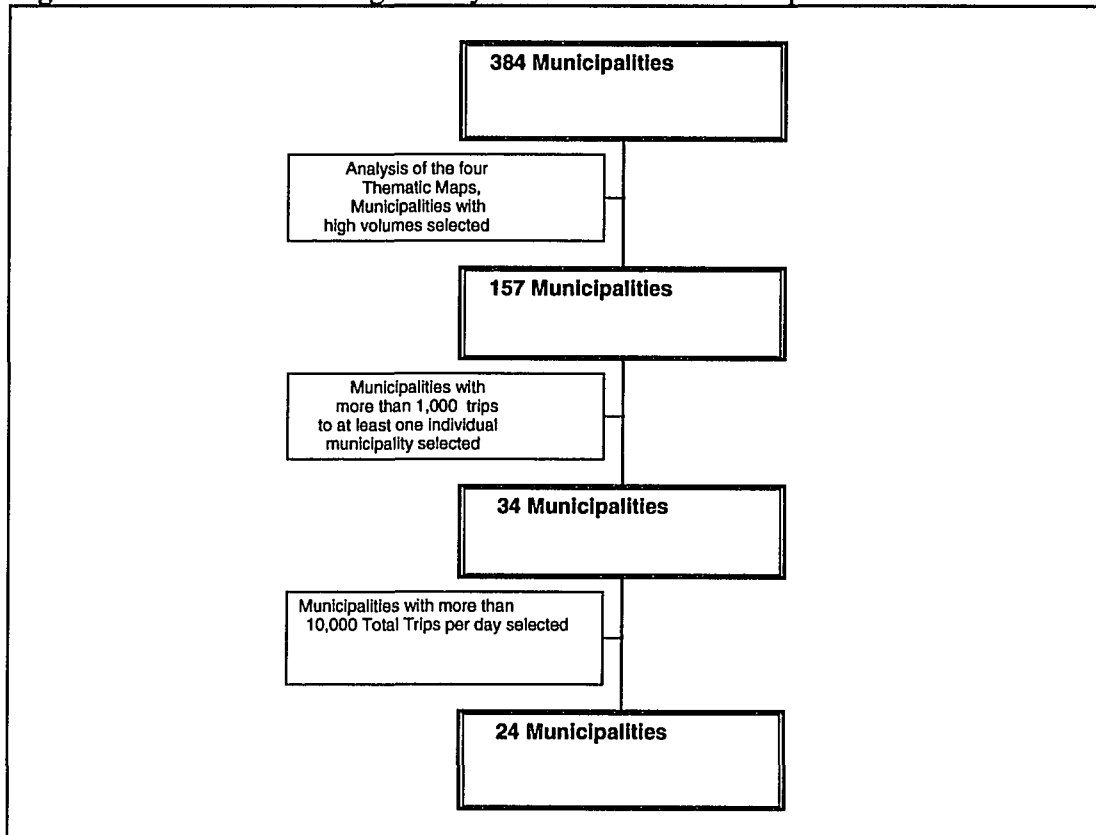
### **METHODS FOR SELECTING MUNICIPALITIES FOR JOURNEY TO WORK ANALYSIS**

#### **3.1 Introduction**

This chapter will explain the methodology of reducing the number of municipalities from 384 to twenty-four. Chapter 4 is an in-depth analysis of the twenty-four municipalities. An analysis of all 384 municipalities would be required if the information were applied to a comprehensive model for the NJTPA region. The purpose of the thesis is to examine origin and destination data for municipalities with large numbers of trips, both attracted and produced in the NJTPA region.

There were three steps taken to reduce the 384 municipalities to twenty-four municipalities. The first step was to select 157 municipalities from the original 384 by examining four thematic maps. The second step involved a selection from the 157 from the municipalities that had over one-thousand trips produced to at least one destination other than the same municipality. This further reduced the number to thirty-four. The thirty-four municipalities were reduced to twenty-four in the third step. This step was carried out by examining the total number of trips produced by each of the thirty-four municipalities. If there were at least ten-thousand total trips produced from a given municipality, then the municipality was used in the analysis. Figure 1 is a flow chart which illustrates the four step selection process to focus the search to twenty-four municipalities. The first step toward that goal will be discussed next.

**Figure 1 Process for Selecting Twenty-Four Out of 384 Municipalities**



### 3.2 First Step - Selecting the 157 out of the 384 Municipalities

The first step involved the production of four maps and the use of a municipal database which contained the following information:

- Name of the municipality.
- Population of the municipality.
- Total number of commuters.
- Total number of transit riders.
- Number of people who commute per one thousand people.
- Number of people who commute per one thousand jobs.

From the database, four maps were produced showing where large numbers of commuters originated and where they were enroute. The four thematic maps were as follows: total

number of commuters, total number of commuters per one thousand people, total number of commuters per one thousand jobs, and total number of transit riders. The 157 were selected based on the municipalities with large numbers of commuters and transit from a comparison of the four thematic maps.

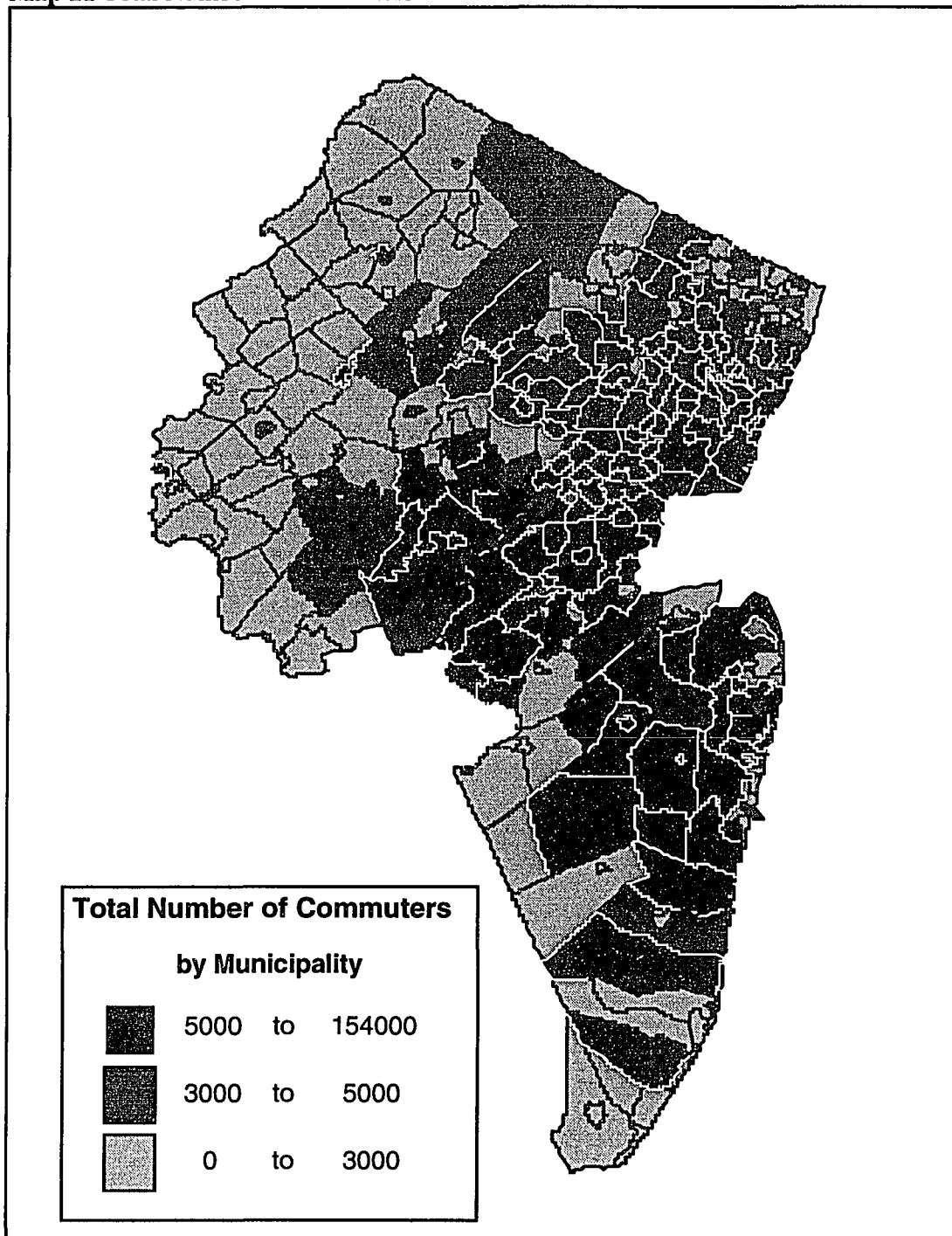
### **3.2.1 Map 21 - Total Number of Commuters**

Map 21 depicts the total number of commuters. The dark (high range) municipalities had at least five thousand commuters, the gray (middle range) municipalities had three to five thousand commuters, and the municipalities with light gray (low range) had at most three thousand commuters. The base number was determined by creating a three range map using the statistical method of equal count. Equal count separates a list of numbers into an equal number of datum. When middle and high ranges were combined, they were equal to the same number of municipalities as the low range. This map provided a good overview, but specific populations for each municipality are not taken into account.

### **3.2.2 Map 22 - Total Number of Commuters Per One Thousand People**

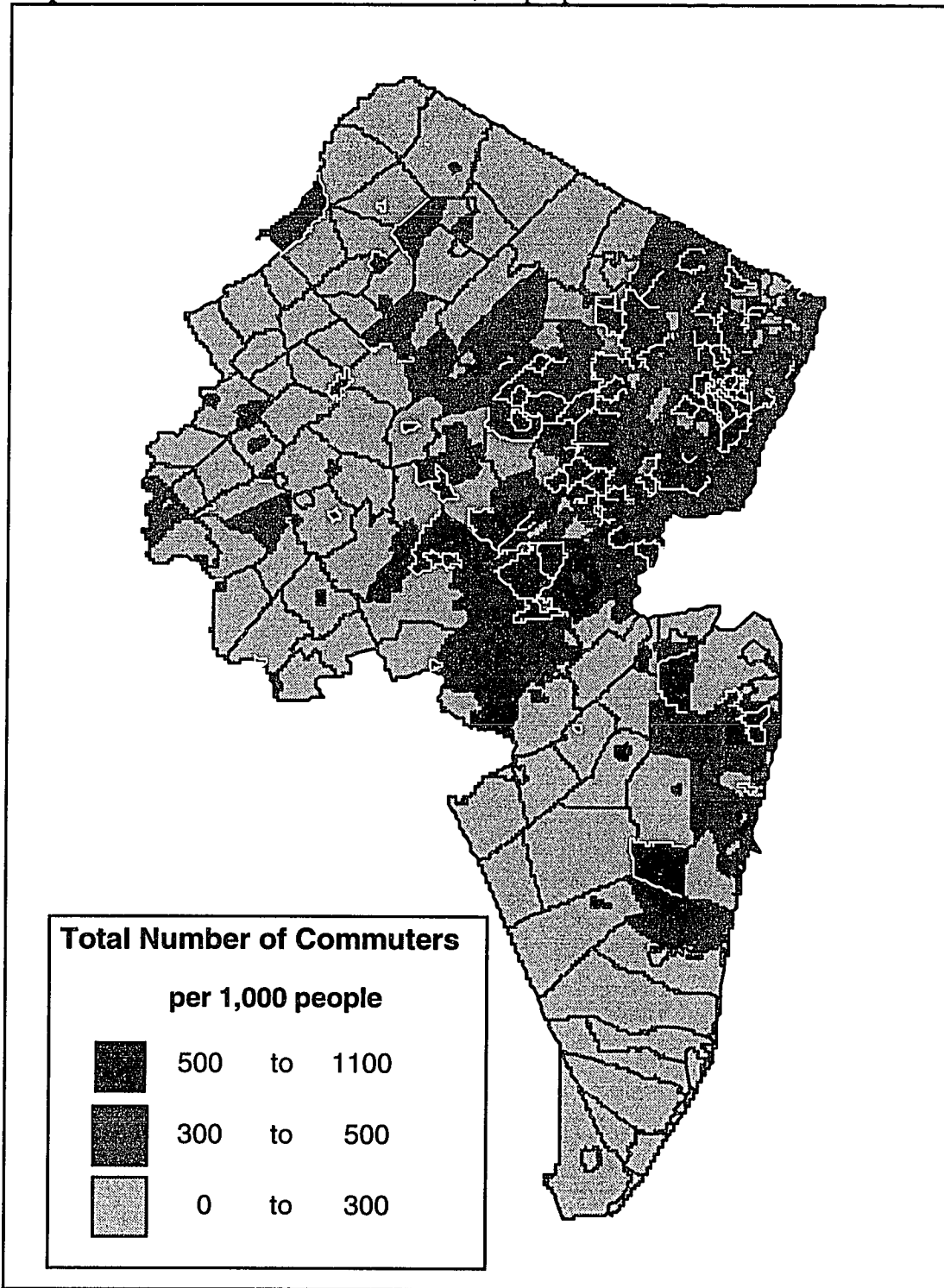
Map 14 was created in the same manner as Map 21, except that the populations for the municipality were included. For the high range, at least five hundred out of every one thousand people commuted. The middle range identified municipalities with three hundred to five hundred commuters and the low range identified municipalities below three hundred commuters. The resulting map showed the formation of the corridors previously discussed in Chapter 2, thus proving there were correlation's between the ten corridors in Chapter 2 and the locations of municipalities with lots of commuters.

**Map 21** Total Number of Commuters



Source: New Jersey Census Transportation Planning Package, 1990

**Map 22** Total Number of Commuters Per 1,000 people



Source: New Jersey Census Transportation Planning Package, 1990



### **3.2.3 Map 23 - Total Number of Commuters Per One Thousand Jobs**

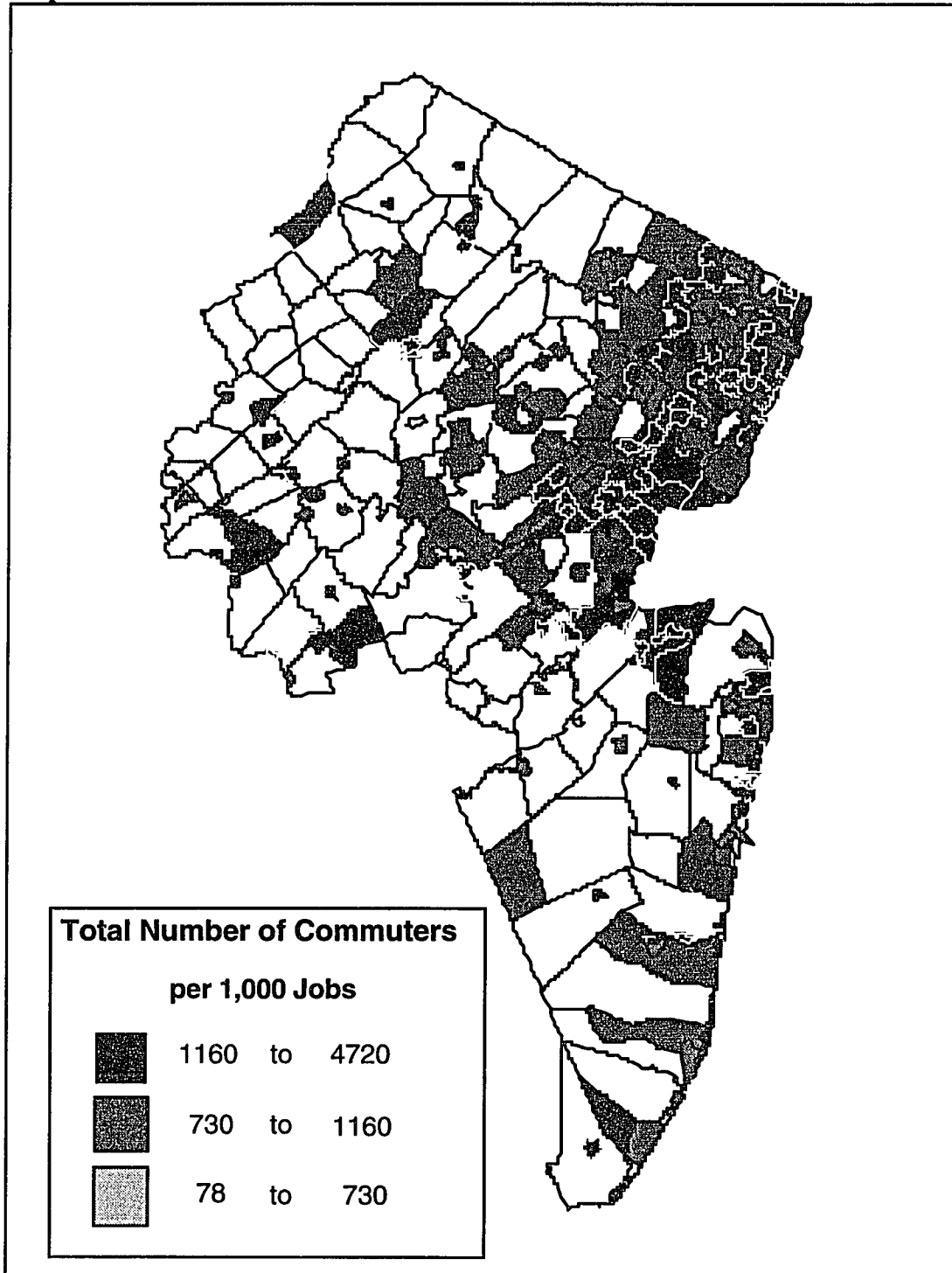
As in the last two maps, three ranges were created. In this case, however, all three ranges had the same number of municipalities. The high range had at least 1,166 commuters per one thousand jobs. The middle range had between 730 and 1,165 commuters per one thousand jobs. The low range categorized commuters 729 and lower per one thousand jobs. The middle and high ranges for this map identified the location of the highest number of job sites based on the number of commuters from each municipality.

### **3.2.4 Map 24 - Total Number of Transit Riders**

This map showed the total number of transit riders per municipality. There were three ranges as follows: the high range was at least three hundred riders, the middle range was at least two hundred riders, and the low range was less than two hundred riders. The purpose of this map was to ensure that municipalities with a high number of transit riders were considered when determining which municipalities to select for further analysis.

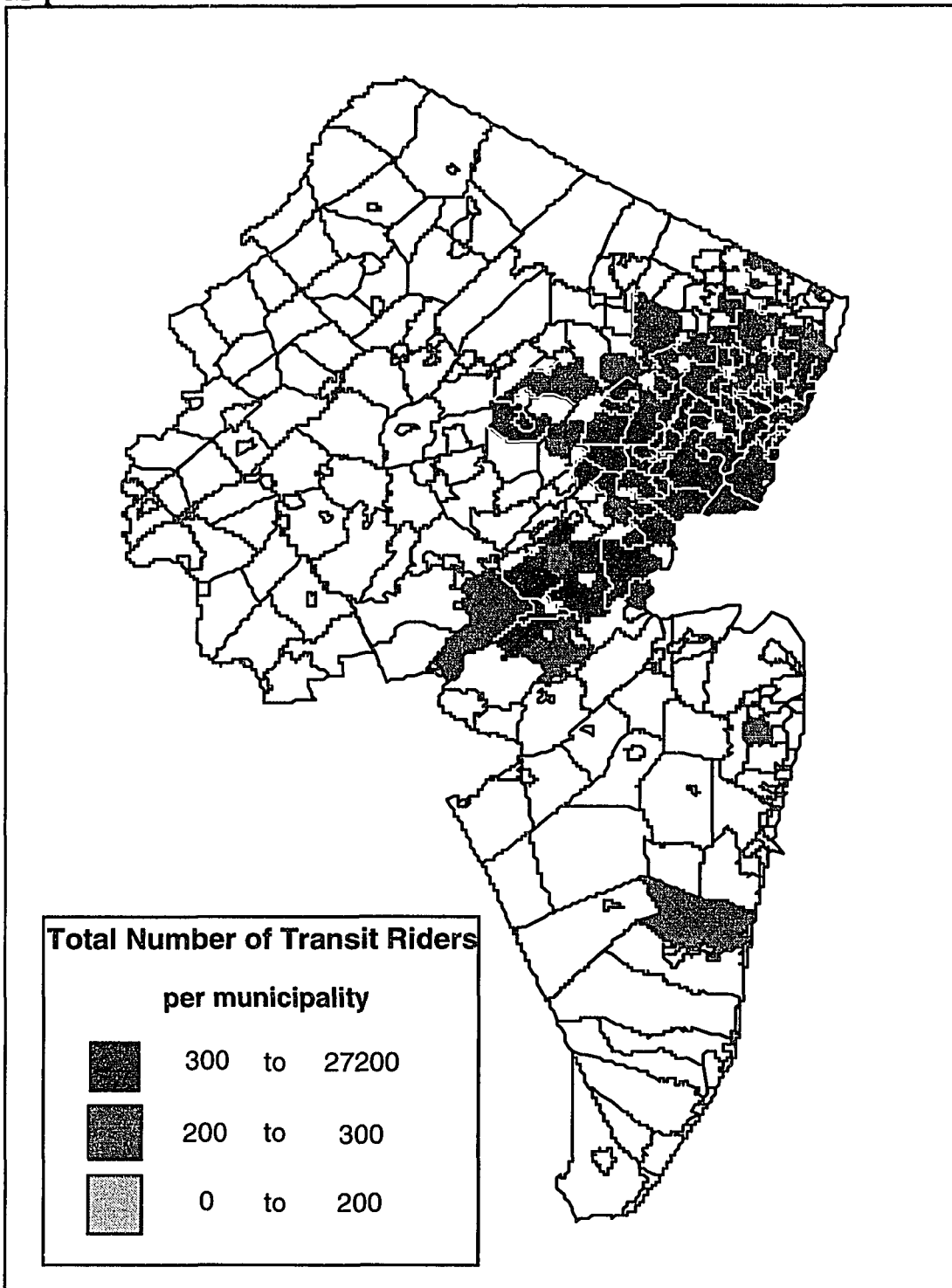
### **3.2.5 Analysis of the Four Maps**

Once the maps four were created and compared to each other, a clear indication of which municipalities had high amounts of jobs, commuters, and transit users were apparent. Municipalities which were in the high range on all four maps were selected first. The next cut was taken if municipalities were in the middle and high range on all of the maps except Map 24. Map 24 only showed the current riders, not the potential ridership. The third cut was taken from Map 22 and Map 23, which focused on population in conjunction with total commuters. Municipalities chosen in the first selection needed to

**Map 23** Total Number of Commuters Per 1,000 Jobs

Source: New Jersey Census Transportation Planning Package, 1990

Map 24 Total Number of Transit Riders



Source: New Jersey Census Transportation Planning Package, 1990

be in the middle or high range on at least two maps and in the high range on at least one map. By doing so, the probability increased that the selected municipalities might show travel patterns which would encourage new transit lines.

The resulting methods selected 157 municipalities from the original 384. Once all of the municipalities were selected by using the above methods, there were many municipalities not chosen that were located between two selected ones. In order to prevent gaps, those “in-between” were also selected. The 157 selected included “in-between” municipalities as well as targeted municipalities.

### 3.3 Second Step - Selecting 34 from the 157

Each of the 157 selected municipalities contained journey to work information. An example of this database is shown in Figure 2. Each row of the database lists the following:

- The origin municipality.
- The destination municipality.
- Average travel time.
- Total Commuters (people using any type of transportation).
- Single occupancy vehicles.
- Vanpoolers (6+ people per vehicle).
- Carpoolers (2-5 people per vehicle).
- Transit users.
- Bus riders.
- Streetcar riders (trolleys).
- Subway riders (ex: PATH).
- Commuter rail riders.
- Taxicab users.
- Ferryboat users.
- Motorcycle users.
- Bicyclists.
- Walkers.

Categories were listed twice, first for all times, second for peak only

**Figure 2** Example of a Journey to Work Database

Residence	Workplace	Total	Alone	Carpool	Bus	Heavy-rail
West Caldwell township	West Caldwell township	663	523	70	0	0
West Caldwell township	Fairfield township	410	384	26	0	0
West Caldwell township	Newark city	371	291	58	15	0
West Caldwell township	Manhattan borough	355	122	20	142	9
West Caldwell township	Caldwell Borough townsh	336	286	50	0	0
West Caldwell township	Roseland borough	213	213	0	0	0
West Caldwell township	Parsippany-Troy Hills t	165	165	0	0	0
West Caldwell township	Montclair township	156	148	8	0	0
West Caldwell township	Wayne township	143	135	8	0	0
West Caldwell township	Montville township	135	114	21	0	0
West Caldwell township	West Orange township	132	132	0	0	0
West Caldwell township	East Hanover township	115	115	0	0	0

Source: New Jersey Census Transportation Planning Package, 1990

The entire list of journey to work information was combined for all 157 municipalities. For many of these rows, the total number of people using a transportation mode was very low. The database had to be further reduced in order to construct a database in which each row contained journey to work data that could be used to identify a new transit corridor.

### 3.3.1 First Step in Selecting

The database of the 157 municipalities was ordered from highest to lowest based on the total commuters. The database was a good representation of the number of commuters since it included peak travel and non-peak travel. Over two-thirds of the entire database contained information for municipalities which had less than one hundred total trips to

another municipality. This data was deleted from the database since these trips were small in number. The removal of these trips reduced the database to a more manageable size. As a result, a greater focus on the trips that might be transit options was provided.

### **3.3.2 Second Step in Selecting**

With the removal of the ninety-nine or less allmode trips, the remaining database contained 2,661 journey to work entries. At this point, municipalities with the highest number of total trips were selected by the following process; first, the database was ordered highest to lowest based on total trips. Second, the database was scanned from the top, with each residence and workplace compared. If the residence and workplace were the same, they were ignored, since that indicated these commuters never left the municipality. If, however, the residence and workplace were different and had at least one thousand total trips per day, they were recorded as candidates for a journey to work analysis. Third, all entries with less than one thousand commute trips were ignored. Since it takes a large number of commuters traveling between the same municipalities for a transit option to be viable, a threshold of one thousand total trips was selected. By selecting one thousand total trips, the 157 municipalities were then reduced to thirty-four.

### **3.3.4 Third Step in Selecting**

Thirty-four municipalities was a manageable number. It was necessary to calculate the total number of commuters traveling during the peak hour for each of the thirty-four municipalities. For about ten of the municipalities, there were less than ten-thousand commuters traveling during the peak hour. Since the twenty-four remaining

municipalities were scattered around the NJTPA region, they became the best chance for the locations of new transit corridors.

### **3.4 Third Step - Creating the Journey to Work Maps**

With the twenty-four municipalities chosen, the final step required attaching the database to the geographic locations of the municipalities and creating thematic maps depicting the journey to work database.

#### **3.4.1 Step One in Mapping**

Each of the twenty-four municipalities had to be individually selected from the 2,661 entries in the database. Once selected, every municipality was then joined with a file containing the geographic locations for each of the 384 municipalities. Using the MapInfo desktop mapping package, the selected database was opened. At the same time, the file containing the locations and names of each municipality was opened. The two files were then joined by comparing the workplace name of the selected municipality to the list of municipality names. The resulting database had a geographic location for each of the journey to work entries based on the workplace.

#### **3.4.2 Step Two in Mapping**

MapInfo has extensive thematic mapping options, including producing maps showing high, medium, and low ranges. Since the highest concentration of commuters travel during the peak hour, the total commuters traveling during the peak hour was used to create the ranges for the journey to work maps. In order for all twenty-four municipalities

to be consistent, the ranges were the same with 1 to 499 peak commutes for the low range, 500 to 999 peak commutes for the middle range, and 1,000 or more for the high range.

These ranges provided for a direct analysis. The municipalities in the middle or high range will be the trips focused on for transit potential. If a bus, commuter rail, subway, or trolley currently connect, then it is determined that a transit corridor already exists for the high or middle range journey. On the other hand, if no transit exists for the high or middle range municipalities, then a new potential transit corridor will be formulated.

### **3.5 Preparation of Maps for the New Jersey to New York or Trenton Commute**

The procedure for creating these maps was similar to the intra-New Jersey journey to work maps. The databases contained the same information; therefore, the method for joining the database with the locations of the municipality was similar. The databases had the workplace as one of the five boroughs of New York City or Trenton. Since the workplaces were outside the NJTPA region, the connection for joining the geographic locations was based on residence. The low range for the thematic maps included trips of ninety-nine or fewer. The middle and high ranges varied, depending on the volume of commuters. In some cases, there were so many commuters that a fourth range representing very large volumes of commuters was added.

The results gained from these maps identified the locations where the greatest number commuters were located and whether these municipalities had transit service. If transit routes existed, then creating new transit routes was not necessary. If transit did not



exist, then new transit routes serving these non-NJTPA locations were discerned. The ultimate goal of this thesis was to identify these new transit markets based on the demand for the connection.

### **3.6 Concluding Remarks**

This chapter explained the step-by-step process used to reduce the number of municipalities from 384 to twenty-four. In doing so, four thematic maps and the journey to work database were used. The twenty-four municipalities will be closely examined in Chapter 4 in order to determine which, if any, could support new transit routes.

## **CHAPTER 4**

### **JOURNEY TO WORK RESULTS FOR NJTPA REGIONAL COMMUTES**

#### **4.1 Introduction**

In this chapter, three tasks were accomplished. First, the term “New Transit Corridor” was defined. Second, the twenty-four municipalities that were selected for analysis, were evaluated in three ways; the percentage of trips enroute to the same destination, the percentage of transit used to reach their destination, and the travel times that commuters were willing to endure. The third task was to select the North Jersey municipalities that appeared to be common destinations for a majority of the trips. At this point, these municipalities were established as workplaces or destinations. The origins or residences were the focus of the analysis. If the origins had a significant number of trips, then the region between the origin and destination could be a new potential transit corridor. The definition of what a significant number of trips is will be defined first.

#### **4.2 Definition of a Transit Corridor**

NJ Transit uses a model to search for possible new rail or bus routes. In addition to journey to work data, socio-economic data is used as well. The socio-economic data includes: population density, per capita income, the number of dwelling units, etc.(1).

The definition of a new potential transit corridor is based on a few factors. First, there is the factor of whether there is a significant number of trips between the origin and destination of a corridor. A significant number of trips is defined as five hundred or

greater. Second, all data used in this chapter will be for the peak hour only, since the greatest concentration of trips are clustered between 6:30 to 9:00 in the morning and 4:30 to 6:30 in the evening. Transit works best with large volumes over a short period of time rather than low volumes scattered throughout the day. This can be seen in three rail lines or segments of lines which offer peak hour service only. These lines are the Pascack Valley Line, Boonton Line, and the last segment of Raritan Valley Line (Raritan to High Bridge).

### **4.3 The Examination of the Twenty-Four Municipalities**

There were three tables created to summarize the findings found concerning the twenty-four municipalities. Table 11 was created to examine the twenty-four municipalities and identify those with high percentages of trips to destinations less than ten miles and to destinations between ten to twenty-five miles. It also included the travel times and the percentage of trips to points within the municipality. The following information is included in Table 11:

**Municipality:** The name of the township, city, or borough.

**Worked Within Municipality:** Percentage of people who worked within the same municipality in which they lived.

**Worked Outside:** Percentage of people who commuted to points outside of their residence municipality.

**Worked Within 10 Miles:** Percentage of trips to destinations within ten miles of the origin municipality.

**Travel Time:** The furthest travel time to reach places of employment.

**Worked Between 10-25 Miles:** Percentage of trips to destinations between ten to twenty-five miles from the origin municipality.

**Table 11** The Percentages of Trips Between Municipalities and Destinations

Municipality	Worked Within Municipality	Worked Outside Municipality	Worked Within 10 Miles	Travel Time (Mins.)	Worked Between 10-25 Miles	Travel Time (Mins.)
Brick	19%	81%	34%	27	23%	44
Bridgewater	18%	82%	40%	27	18%	41
Dover	39%	61%	24%	30	18%	71
East Brunswick	16%	84%	40%	41	4.4%	58
Edison	22%	78%	32%	25	19%	52
Elizabeth	32%	68%	46%	37	7%	46
East Orange	17%	83%	57%	42	9%	42
Hoboken	18%	82%	13%	28	69% <sup>a</sup>	10
Irvington	12.5%	87.5%	53%	41	8%	46
Jersey City	37%	63%	24%	40	2.6%	49
Middletown	19%	81%	31%	26	19%	57
North Bergen	17%	83%	59%	34	1.4%	45
North Brunswick	15%	85%	45.8%	30	4%	57
Newark	49%	51%	35%	36	7%	41
Old Bridge	9.6%	90.4%	45%	41	7%	55
Parsippany-Troy Hills	19%	81%	48%	38	13%	51
Passaic City	49%	51%	46%	32	4.6%	47
Perth Amboy	35%	65%	49%	28	9.9%	35
Piscataway	22%	78%	52.5%	37	2.7%	50
Union City	20%	80%	43.4%	29	4.5%	32
Union	17%	83%	40%	29	18.6%	38
West New York	22%	78%	33%	32	10.7%	42
West Orange	16%	84%	42%	34	9%	37
Woodbridge	21%	79%	24%	34	22.2%	55

Source: New Jersey Census Transportation Planning Package, 1990

Table 12 was created to identify the municipalities that have a percentage of transit riders using NJ Transit's bus and rail network. Not surprisingly, most of the transit trips were to destinations such as Newark, Jersey City, Hoboken, and Elizabeth. Table 12 included:

<sup>a</sup> This percentage refers to trips to New York City.

**Municipality:** The name of the township, city, or borough.

**Used Rail Lines:** Percentage of trips made using one of NJ Transit's rail lines.

**Used Bus Lines:** Percentage of trips made using one of NJ Transit's bus lines.

**Destination Cities:** Cities that were attracting transit riders.

**Table 12** Percentages of Transit Used to the Following Destination Cities  
(Commuter Rail, Bus, or PATH)

<b>Municipality</b>	<b>Used Rail Lines</b>	<b>Used Bus Lines</b>	<b>Destination Cities</b>
Brick	6%	NE	Elizabeth, Newark, Jersey City
Bridgewater	20%	NE	Newark
East Brunswick	9%	NE	Newark, Jersey City, Elizabeth
Edison	7%	0%	Newark
Elizabeth	3.5%	9%	New Brunswick, Edison Woodbridge, Newark, Jersey City
East Orange	2%	19%	Newark, Jersey City, Hoboken
Hoboken	9.6%	NE	Newark, Jersey City
Irvington	NE	25%	Newark
Jersey City	NE	18%	Newark, Hoboken, Harrison
Middletown	23%	0%	Newark
North Bergen	NE	15%	Hoboken, Jersey City
North Brunswick	13%	2%	Newark, Jersey City
Newark	1.6%	20%	Northeastern New Jersey
Old Bridge	NE	24%	Newark, New Brunswick
Parsippany-Troy Hills	2.5%	NE	Newark
Passaic City	NE	16%	Paterson
Perth Amboy	17%	NE	Newark
Piscataway	12%	NE	Newark
Union City	NE	24%	Hudson County
West Orange	<1%	3%	Newark
Woodbridge	7.4%	<1%	Newark

Source: New Jersey Census Transportation Planning Package, 1990

NE: Not Examined

From the information in Table 11 and Table 12, it can be concluded that the data did not clearly point out municipalities with high volumes to particular locations. A second

method was needed to depict the data geographically. Instead of attaching all twenty-four municipal maps and showing the destinations for each case, three representative examples will be used.

#### **4.3.1 Example 1 - Mapping Dover Township (Ocean County)**

Dover is located next to Brick Township in the northeastern corner of Ocean County.

Dover had 18,117 people commuting per day with 39% working within the township.

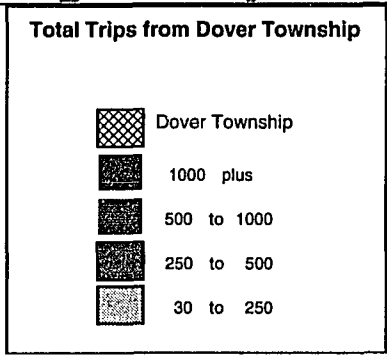
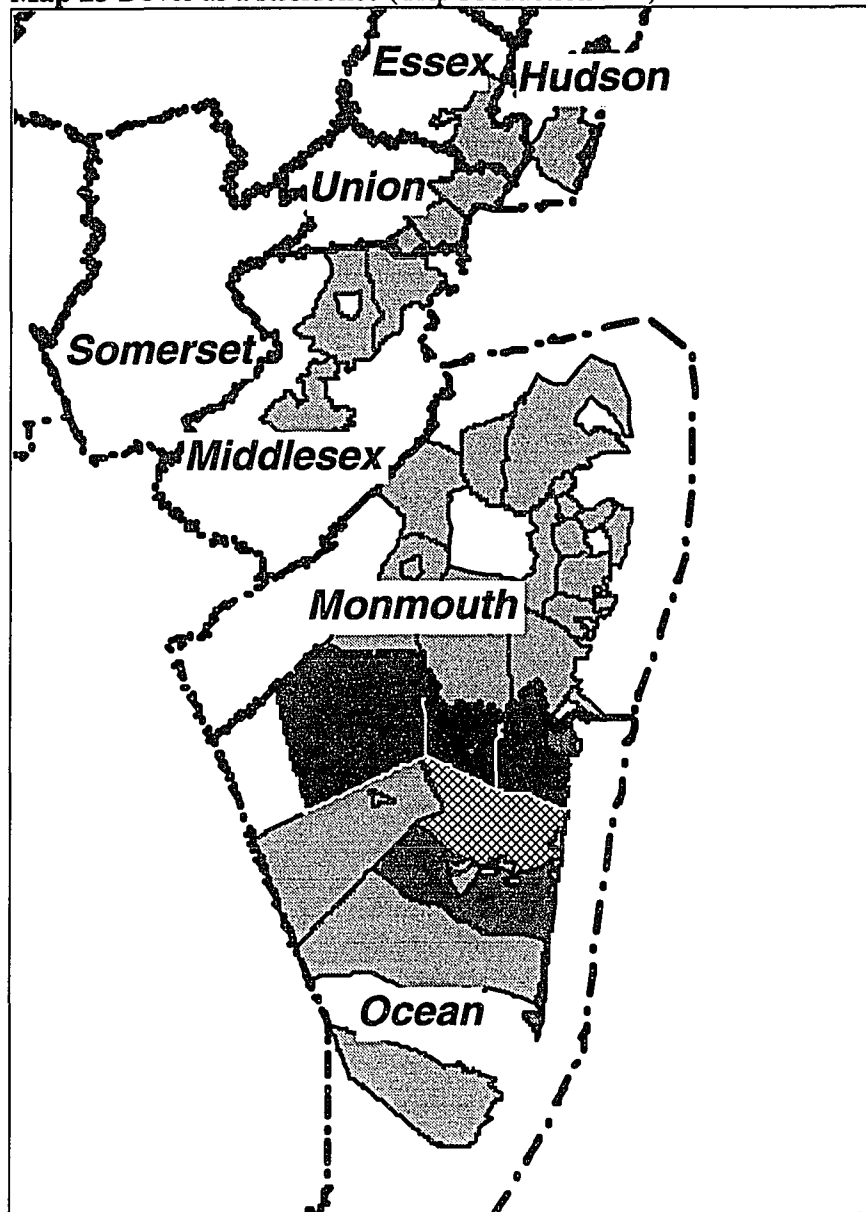
From the remaining 61%:

- 24% worked within ten miles, with a thirty minute maximum commute time.
- 18% worked within thirty miles (Monmouth and Ocean Counties), with a seventy-one minute maximum commute.
- 15% either worked in New York or dispersed throughout New Jersey.

In order to visualize the trips geographically, refer to Map 25. The points further away from Dover attract less trips. A line of municipalities from East Brunswick through Jersey City was formed to create a corridor. This is the same corridor which NJ Transit's Northeast Corridor line runs through. As previously mentioned in Chapter 2, Corridor 7 examined the Northeast Corridor line and the trips attracted to the corridor. There were over 100,000 trips attracted to Corridor 7. By mapping Dover Township, one of the producers of those trips can be identified.

Another example could be seen in Corridor 8, which examined the municipalities along the US 9 bus corridor. This corridor had over 100,000 trips attracted from points outside. One of the sources of these trips was Dover, as can be seen in Map 25 .

Map 25 Dover as a Residence (Trip Production Site)



Source: New Jersey Census Transportation Planning Package, 1990

### **4.3.2 Example 2 - Mapping Union Township (Union County)**

Union is located southwest of Newark. There were 14,217 commuters, of which 17% worked in Union. The other 83% commuted to six different regions.

- 23% traveled to jobs within Union County, the furthest of which was twenty-nine minutes.
- 14% journeyed to job sites in Essex County (except Newark), the longest commute being twenty-nine minutes.
- 12% commuted to the Newark/ Jersey City region, the furthest commute taking thirty-five minutes.
- 3% traveled to the Edison region with the furthest commute being forty-three minutes.
- 5% traveled to the Morristown region, with a travel time of thirty-eight minutes.
- 1.6% commuted to the Clifton/ Paramus region, the longest travel time taking thirty-five minutes.
- 24.4% either traveled to New York or municipalities scattered throughout New Jersey.

In order to see the trips geographically, refer to Map 26. As was the case in Example 1, the further away from Union, the less trips attracted. The important thing to recognize was that Edison and Newark had large amount of commuters. Using the maps created, the recognition of large amounts of commuters enroute to the same municipalities was the best means for selecting the municipalities for new transit potential.

### **4.3.3 Example 3 - Mapping Woodbridge Township (Middlesex County)**

Woodbridge is located north of Perth Amboy and east of Edison. There were 27,323 commuters and 21% of them worked in Woodbridge. The other 79% traveled to seven different regions:



- 7% commuted to the New Brunswick region (south of the Raritan River) and Cranbury, with the furthest travel time of thirty-four minutes.
- 23% traveled to the Edison/ Piscataway region (north of the Raritan River), with the longest commute of twenty-seven minutes.
- 1% journeyed to the Bridgewater region, with an average travel time of thirty-four minutes.
- 10% commuted to points along NJ Transit's North Jersey Coast line, with an average commute of forty-one minutes.
- 1% traveled to the Morristown region, with a commute time of fifty-five minutes.
- 1.2% journeyed to the North Hudson/ Clifton region with the longest commute time taking forty-two minutes.
- 35.8% either worked in New York or scattered throughout New Jersey.

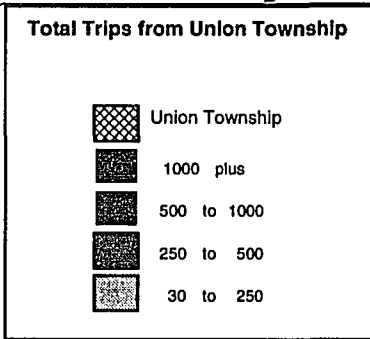
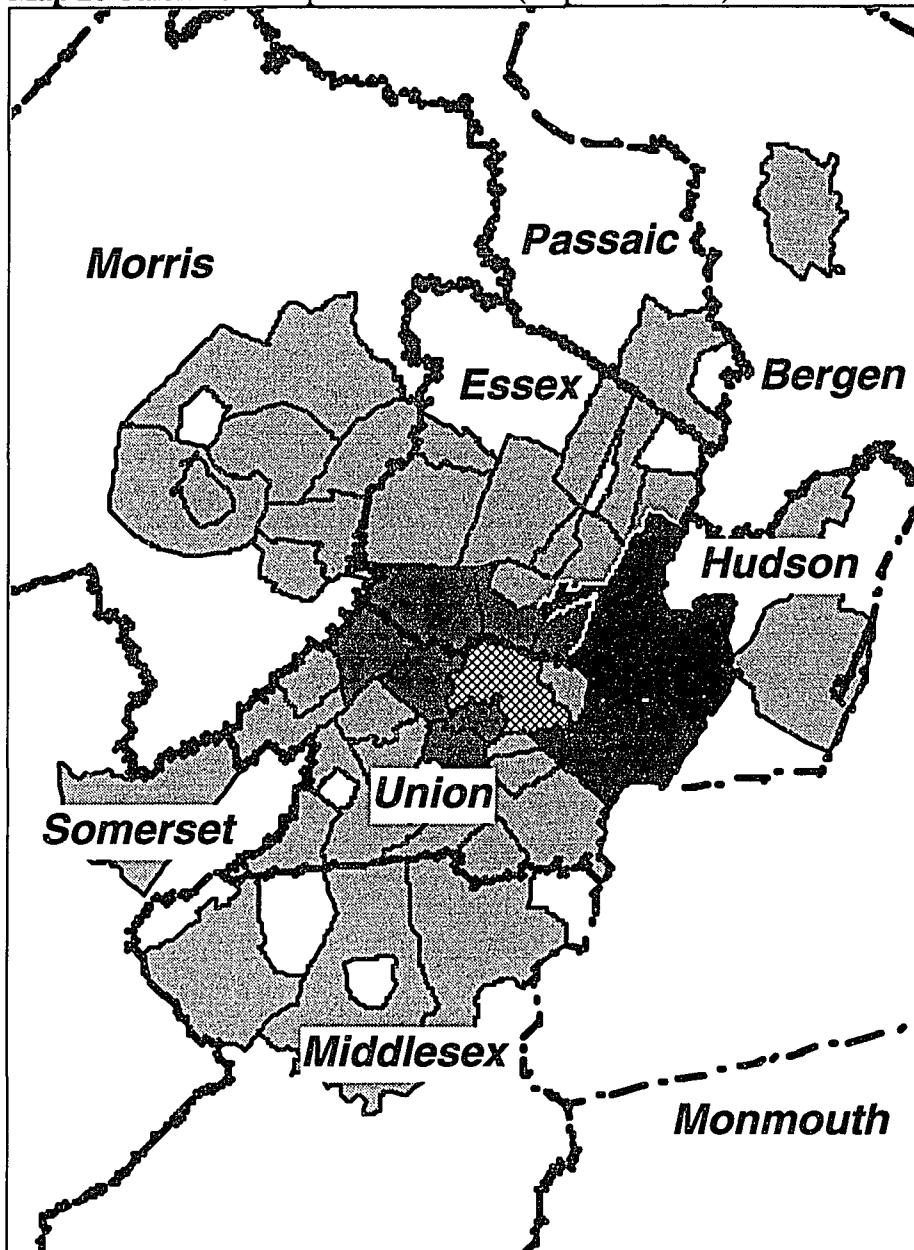
In order to see the trips geographically, refer to Map 27. As was the case in Examples 1 and 2, the further from Woodbridge, the less trips attracted. Edison and Newark attracted the most trips from Woodbridge.

#### **4.3.4 Conclusions Drawn from Examining all Twenty-Four Municipalities**

There were three conclusions based on the careful study of all twenty-four maps. First, the municipalities closest to the source of productions had the largest volumes of trips. Second, the municipalities along the northern Hudson County waterfront, such as North Bergen, Union City, West New York, and Hoboken mostly produced trips to New York.

Their importance will be discussed in Chapter 5. Third, in about 75% of the twenty-four municipalities, Edison, Parsippany-Troy Hills, and Newark represented a destination in which trips were attracted. The third was the most important.

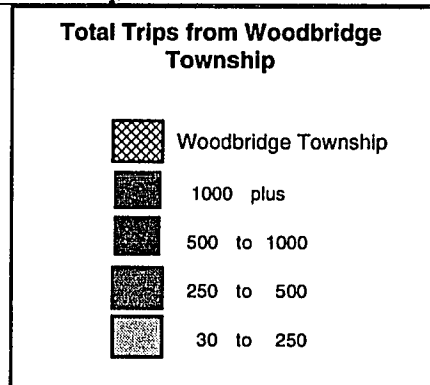
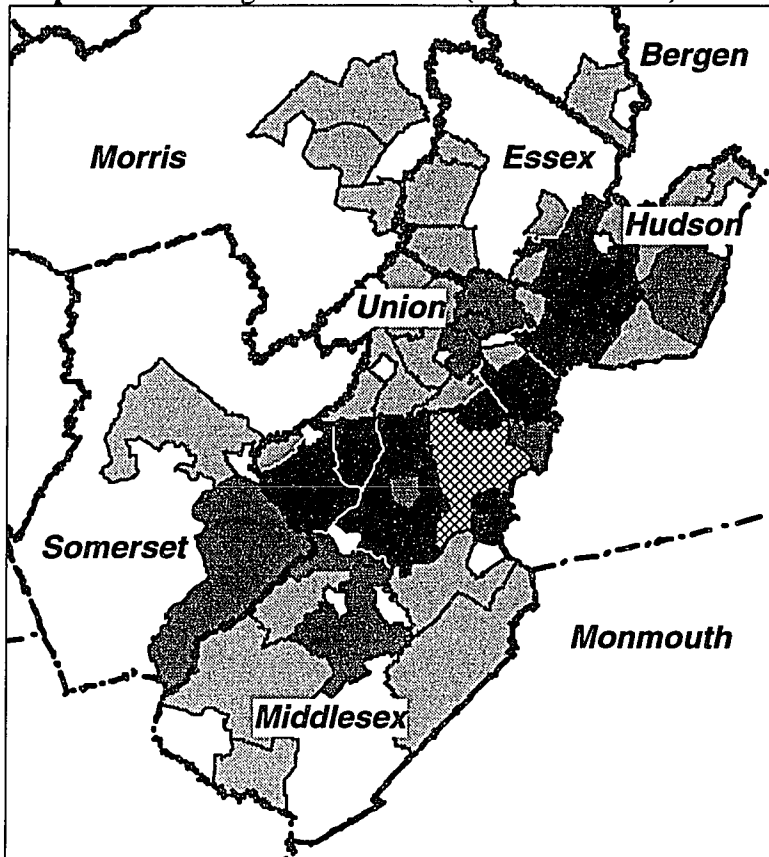
Map 26 Union Township as a Residence (Trip Production)



Source: New Jersey Census Transportation Planning Package, 1990

Determining geographic correlations between the twenty-four municipalities was the primary goal of this thesis. Edison, Parsippany-Troy Hills, and Newark were identified as “hot spots” for trip attraction. The three sites will be closely analyzed in section 4.4 of this chapter. Table 14 listed the three municipalities with the following identified:

**Map 27 Woodbridge as a Residence (Trip Production)**



Source: New Jersey Census Transportation Planning Package, 1990

**Municipality:** Township, city or borough.

**Edison:** Percentage of trips attracted to Edison.

**Newark:** Percentage of trips attracted to Newark.

**Parsippany-Troy Hills:** Percentage of trips attracted to Parsippany-Troy Hills.

**Table 13** Percentages of trips enroute to Edison, Parsippany-Troy Hills, and Newark

<b>Municipality</b>	<b>Edison</b>	<b>Newark</b>	<b>Parsippany-Troy Hills</b>
Brick	1.5%	<1%	<1%
Bridgewater	2.1%	1.8%	1.3%
East Brunswick	7%	1.3%	<1%
Edison	-----	3.2%	<1%
Elizabeth	1.7%	10%	<1%
East Orange	1.1%	24%	2.2%
Hoboken	<1%	2.3%	<1%
Irvington	1.6%	24%	1.4%
Jersey City	<1%	3.7%	<1%
Middletown	2.7%	2.3%	<1%
North Brunswick	7%	2%	<1%
Newark	<1%	-----	<1%
Parsippany-Troy Hills	<1%	2.6%	-----
Passaic City	<1%	1.9%	<1%
Perth Amboy	19%	1.1%	<1%
Piscataway	7.4%	2.0%	<1%
Union City	<1%	1.7%	<1%
Union	1.4%	10.3%	1.3%
West Orange	1%	10%	2.4%
Woodbridge	12%	4.5%	<1%

Source: New Jersey Census Transportation Planning Package, 1990

#### **4.4 Possible New Transit Corridors Based on Journey to Work Data**

After examining the twenty-four municipalities with high amounts of trips produced, there were three municipalities that had large numbers of commuters. The three municipalities were Parsippany-Troy Hills, Newark, and Edison. Each of these municipalities, except for Newark, could be possible candidates for a bus terminal. Bus

terminals work well if constructed in the heart of a central business district (CBD), with bus routes radiating to surrounding municipalities with the highest origins. Since Newark already has been established as a transit hub, it will be examined in terms of whether the existing transit network covers the origins with high volumes.

#### 4.4.1 Edison Township as a Workplace

Aside from the adjacent municipalities which were within a thirty minute commute and had 12,820 Edison bound commuters, there were three corridors for possible transit service. All three corridors either had available transit connecting with Edison or plans for a new rail lines. The ability of the current transit structure to access Edison would require a small amount of capital investment compared to the cost of constructing a new rail line. Map 4.4 depicts where trips were produced enroute to Edison. The three corridors were identified in the map and were also listed in Table 14 with the following:

**Corridor:** Refer to Map 28.

**Trips Attracted:** Total trips attracted along a given corridor.

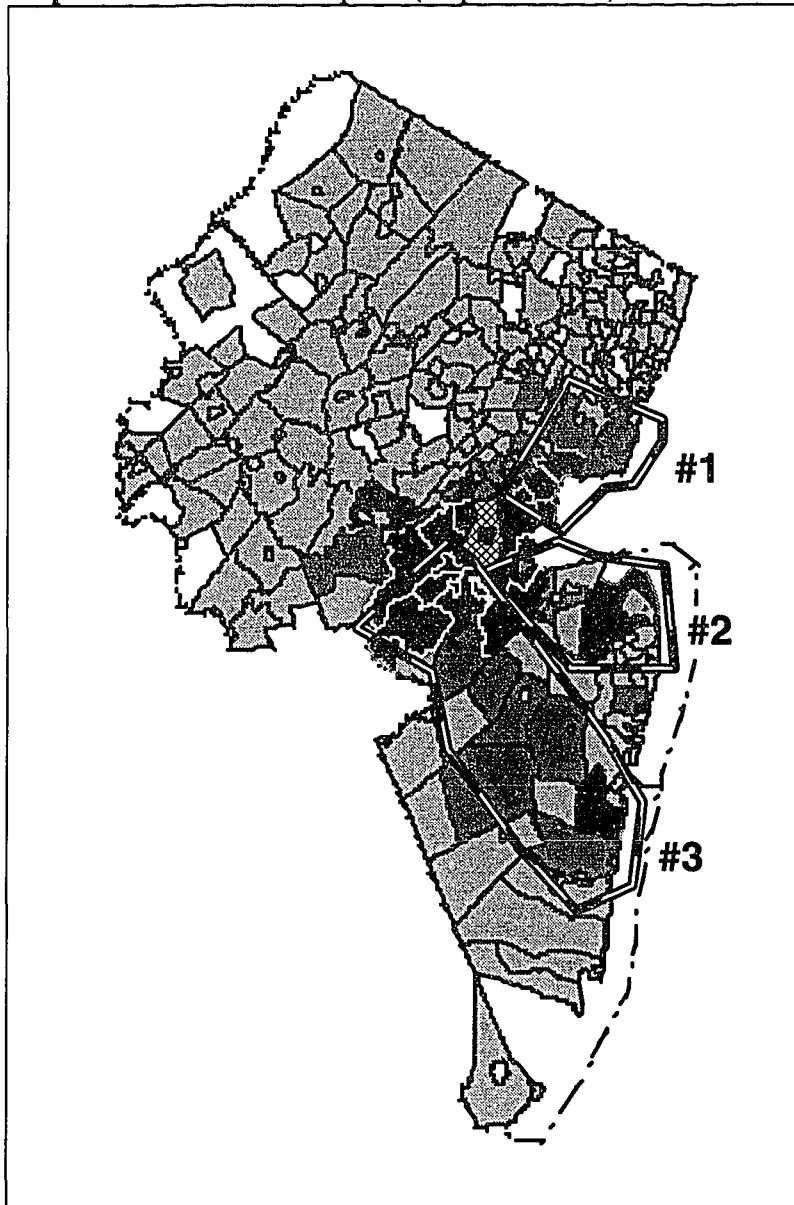
**Origins:** List of municipalities that form the corridor.

**Table 14** New Transit Corridors for Edison Township

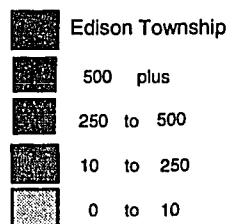
Corridor	Trips Attracted	Origins
1	1,594	Jersey City, Newark, Elizabeth, Linden, Rahway
2	3,061	Middletown, Hazlet, Aberdeen, Matawan, Old Bridge, Sayreville
3	3,591	Dover, Brick, Howell, Freehold, Manalapan, Monroe, Jamesburg, South Brunswick, North Brunswick, and New Brunswick

Source: New Jersey Census Transportation Planning Package, 1990

**Map 28 Edison as a Workplace (Trip Attraction)**



**Total Trips Enroute to Edison Township**



Source: New Jersey Census Transportation Planning Package, 1990

The first possible corridor was the Newark/ Elizabeth corridor. This is also the same route as NJ Transit's Northeast Corridor line, indicating that transit already exists for these municipalities.

A second potential corridor was the Middletown/ Hazlet corridor. There was a bus line which traveled through this corridor, but it entered a couple of municipalities (Keyport, Keensburg, and Union Beach) which had few Edison bound commuters. Also the bus line ended in Woodbridge, not Edison. A revised bus route passing through the six municipalities is recommended for this area. Since Edison has corporate parks, bus routes would need to access all the major sites. The largest site within Edison was the Metropark Complex. This site would be a prime location for a bus/ rail terminal.

A second option for this corridor could be to design the junction between NJ Transit's Northeast Corridor Line and North Jersey Coast Line in Rahway to allow a train to travel directly to New Brunswick and Trenton. This type of transportation system would allow residents of the coast line towns to use the Coast Line trains to reach Edison.

A third potential corridor stretched from Ocean County, through Monmouth County, and ended in Edison. NJ Transit has been studying a rail line from Lakewood (just north of Dover) through Freehold, Jamesburg, South Brunswick, North Brunswick, and New Brunswick. This rail, called the MOM line, would provide transportation within the corridor.

#### **4.4.2 Newark City as a Workplace**

There were 56,521 commuters enroute to Newark within the NJTPA region. All of the possible transit corridors had either rail lines or bus lines already connecting Newark with

the region. The Bergen/ Passaic region has bus lines connecting to Newark. The Morris and Essex region has NJ Transit's Morris & Essex line connecting to Newark with bus lines filling in the gaps. The western Union and Somerset region is connected by the Raritan Valley line. NJ Transit's Northeast Corridor connects the New Brunswick/ Edison region with Newark. Finally, the North Jersey Coast is connected by NJ Transit's North Jersey Coast Line. The municipalities located south of the Bay Head has bus service linked directly to Newark.

#### **4.4.3 Parsippany Troy-Hills Township as a Workplace**

The commuting patterns looked like spokes rather than the typical bullseye pattern as seen in Edison. There were five defined spokes which could be candidates for future transit service. Map 29 indicates where trips were produced enroute to Parsippany-Troy Hills. The five corridors were identified in the map and were also listed. Corridor 1 had one bus line which traveled this corridor, yet it never quite reached Parsippany-Troy Hills. A revised bus route might work, ensuring each major corporate park was accessed at Parsippany-Troy Hills, as was the case in Edison.

The second spoke was a northern corridor, extending well into Sussex County. Presently, the I-80 carpool lanes cater to this corridor. This is an excellent corridor for bus service which could also utilize the High Occupancy Vehicle (HOV) lane located along I-80 between Dover and I-287. Table 15 contains the following information:

**Corridor:** Refer to Map 29.

**Trips Attracted:** Total trips attracted along a given corridor.

**Origins:** List of municipalities that form the corridor.



**Table 15** New Transit Corridors for Parsippany-Troy Hills Township

Corridor	Trips Attracted	Origins
1	2,393	Washington, Mount Olive, Chester, Roxbury, and Randolph
2	2,192	Vernon, West Milford, Sparta, Hapatcong, Jefferson, Rockaway, and Denville
3	1,029	Clifton, Paterson, West Paterson, Wayne, Pequannock, Lincoln Park, and Montville
4	3,506	Municipalities in Essex and Hudson
5	979	Franklin, Hillsborough, Bridgewater, Bernards, Bernardville, and Bedmister

Source: New Jersey Census Transportation Planning Package, 1990

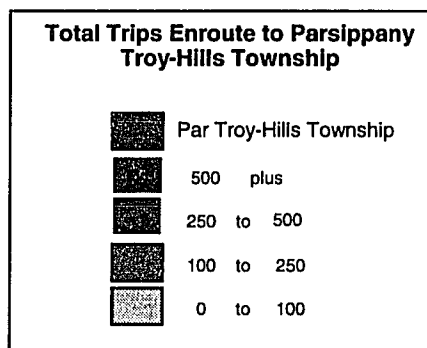
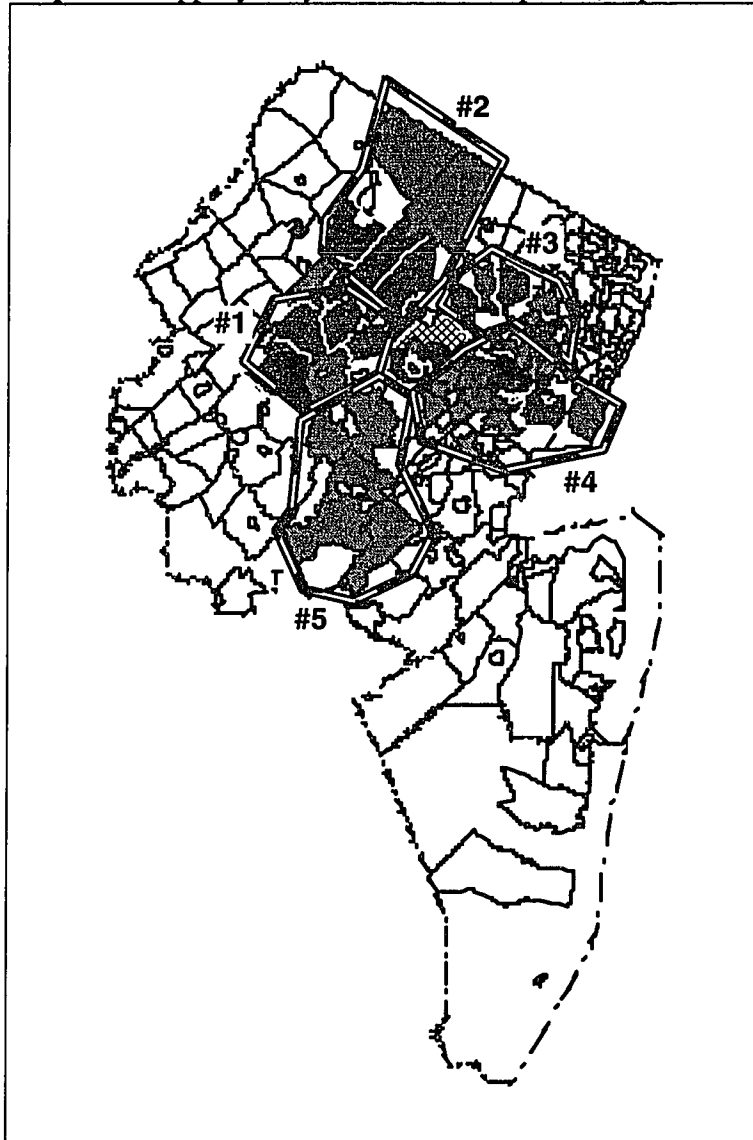
The third spoke was a northeastern corridor. This corridor has an existing county bus running along US 202. The fourth spoke was an eastern corridor, extending to the Hudson Waterfront. NJ Transit's Morris & Essex Line served these commuters, with a bus service filling in the gaps in central Essex County.

The fifth spoke was the southern corridor. There was no bus service connecting this corridor with Parsippany Troy-Hills; therefore, another candidate for future transit service was feasible.

#### 4.5 Concluding Remarks

This chapter identified the locations of potential transit corridors. Two tasks were performed, both using geographic proximity as a means of identifying corridors. The first task involved evaluating twenty-four maps which identified the municipal commute patterns. Three municipalities appeared as attractors of trips throughout most of the twenty-four maps. The municipalities were Edison, Newark, and Parsippany-Troy Hills. The second task was to map each of the three municipalities and to search for trips

**Map 29 Parsippany Troy-Hills as a Workplace (Trip Attraction)**



Source: New Jersey Census Transportation Planning Package, 1990

produced along corridors. Newark already had ample transit access, but Edison and Parsippany-Troy Hills had very little transit services. A total of eight new corridors were drawn with descriptions of how the new service might operate. Chapter 5 will use the same techniques that were implemented in Chapter 4. Chapter 5 will also attempt to analyze the potential transit corridors between the NJTPA region, New York City, and Trenton.

## **CHAPTER 5**

### **JOURNEY TO WORK TO POINTS OUTSIDE OF THE NJTPA REGION**

#### **5.1 Introduction**

In Chapter 4, the commute patterns for the intra-NJTPA region were examined. In some cases, new transit corridors were suggested and in other cases rail or bus lines already existed. This chapter will look at the commuters destined to New York City and Trenton. The Bronx, Brooklyn, Manhattan, Queens, and Staten Island are the five boroughs of New York City. Each borough had significant numbers of commuters from the NJTPA region. To make transit effective, large numbers of commuters must be headed from the same origin to the same borough. In order to keep all six destinations constant, the journey to work maps were based on a minimum of one hundred daily peak commuters. The five boroughs will be discussed in alphabetical order. Chapter 5 concludes with an analysis of the Trenton commute.

The process for examining the five boroughs and Trenton was the same as Chapter 4. Thematic maps were produced showing the number of trips enroute to each borough. If there were large enough volumes of trips from adjacent municipalities, a corridor was formed. Since Trenton has been an established bus hub, many of the surrounding suburbs were accessed by NJ Transit. Since the NJTPA region was at least five miles from Trenton, many of the bus routes originating in Trenton did not extend to the NJTPA region.

## 5.2 The New York City Commute

### 5.2.1 The Bronx Commute Pattern

The Bronx had no direct access from New Jersey, without passing through Manhattan or Westchester County. This made the commute more difficult, since part of the traffic was enroute to Manhattan work sites. Table 16 lists the 1990 Bronx statistics.

**Table 16 Bronx Statistics**

Total Commute to the Bronx	5,938
Percentage that used the bus	5.2%
Percentage that used the rail	1.6%
Percentage that used PATH & NYC Subway System	3.5%
Total Percentage who used Transit	10%

Source: New Jersey Census Transportation Planning Package, 1990

There were three possible transit corridors that were shown in Map 31. Table 17 refers to the 1990 statistics for the Bronx commute. Map 30 showed the three corridors with heaviest volumes of trips to the Bronx. The information for Table 17 is listed below.

**Corridor:** Reference number to refer to Map 30.

**Trips Attracted:** Total trips attracted along a given corridor.

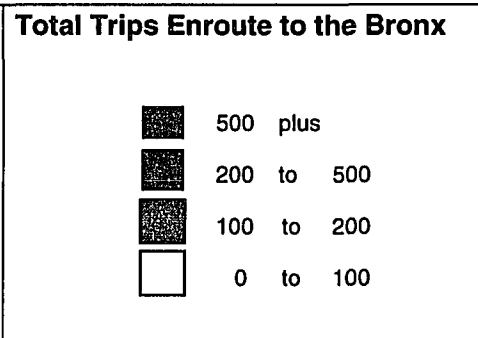
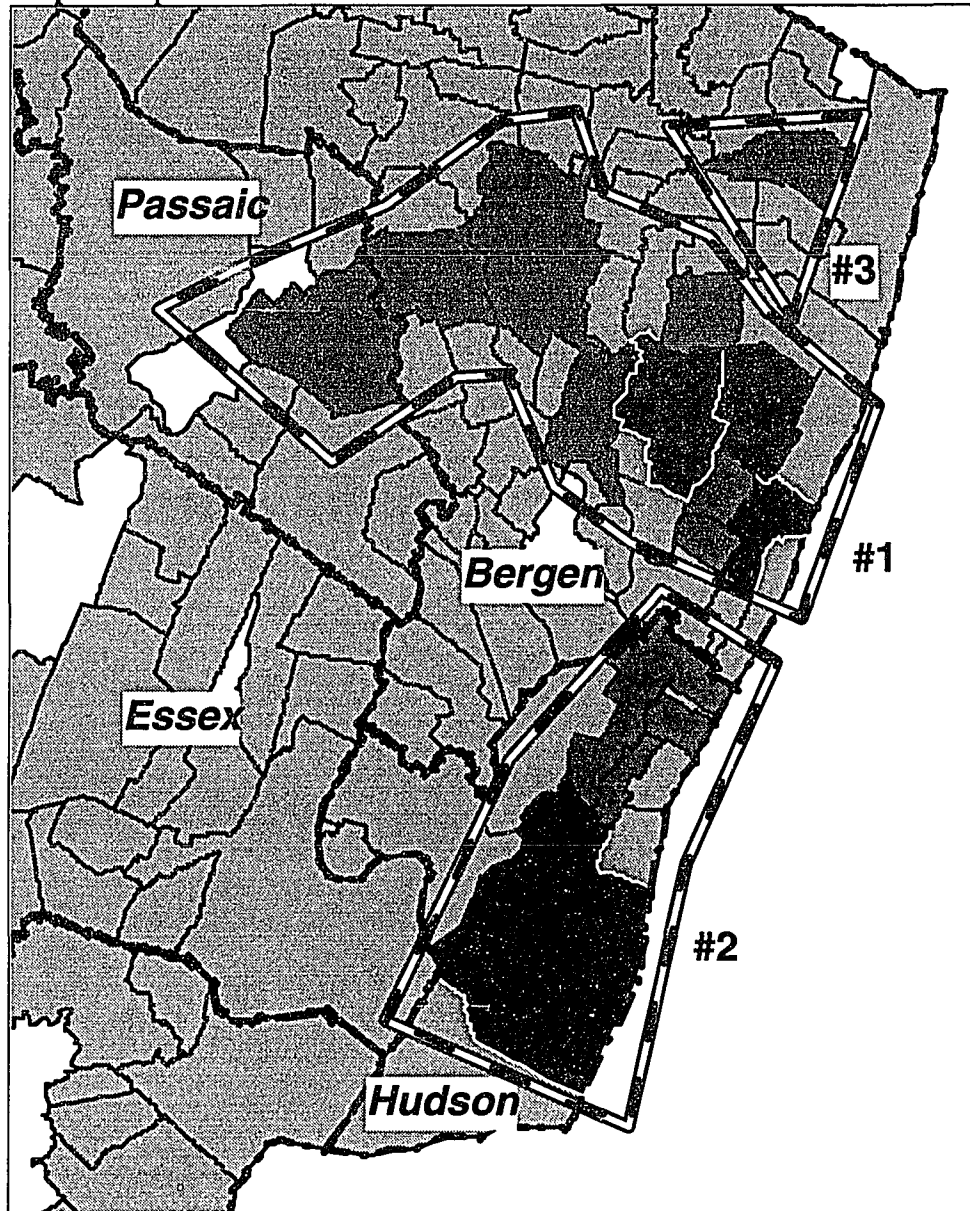
**Origins:** List of municipalities that formed the corridor.

**Table 17 New Transit Corridors for the Bronx**

Corridor	Trips Attracted	Origins
1	1,868	Paterson, Fair Lawn, Paramus, Hackensack, Teaneck, Englewood, Leonia, Palisades Park, and Fort Lee
2	566	Jersey City, Union City, and North Bergen
3	126	Closter

Source: New Jersey Census Transportation Planning Package, 1990

**Map 30 Trips Enroute to the Bronx**



Source: New Jersey Census Transportation Planning Package, 1990

The first corridor had a few bus lines which traveled through each of the municipalities listed in Table 17. The bus lines terminated at the George Washington Bridge Bus Terminal. The only improvement was to determine where most of the commuters were destined in the Bronx in order to provide service directly to specific Bronx work sites. Currently, these commuters must transfer to a subway in Manhattan to complete their trip to the Bronx.

The second corridor had a bus from North Bergen to the George Washington Bus Terminal. The remaining municipalities had access to the Port Authority Bus terminal or PATH system to reach Manhattan, where they could switch to the New York City Subway System. As stated in the first example, the only means of improving service for this corridor would be to extend the bus bound for the George Washington Bridge to work sites in the Bronx.

The third corridor was a spur of the first one, since it included one municipality. There were no buses from this municipality, which makes this a possible candidate for bus service. Instead of planning a bus service into the Bronx, a simple spur route from the Paterson, Hackensack, Fort Lee corridor might work equally as well.

### **5.2.2 The Brooklyn Commute Pattern**

Brooklyn, as was the case of the Bronx, was not accessible directly from New Jersey without traveling through either Manhattan or Staten Island. The Brooklyn bound commuter had to take the New York City Subway System in order to complete the trip. There were three possible corridors and one lone municipality that had at least one

hundred commuters enroute to Brooklyn. Table 18 lists the statistics for the Brooklyn commute.

**Table 18 Brooklyn Statistics**

Total Commute to Brooklyn	9,222
Percentage that used the bus	16%
Percentage that used the rail	10%
Percentage that used PATH & NYC Subway System	9%
Total Percentage who used Transit	35%

Source: New Jersey Census Transportation Planning Package, 1990

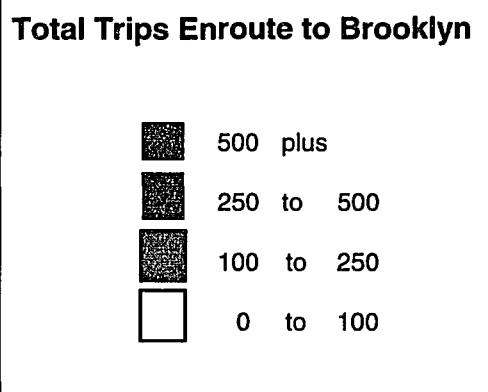
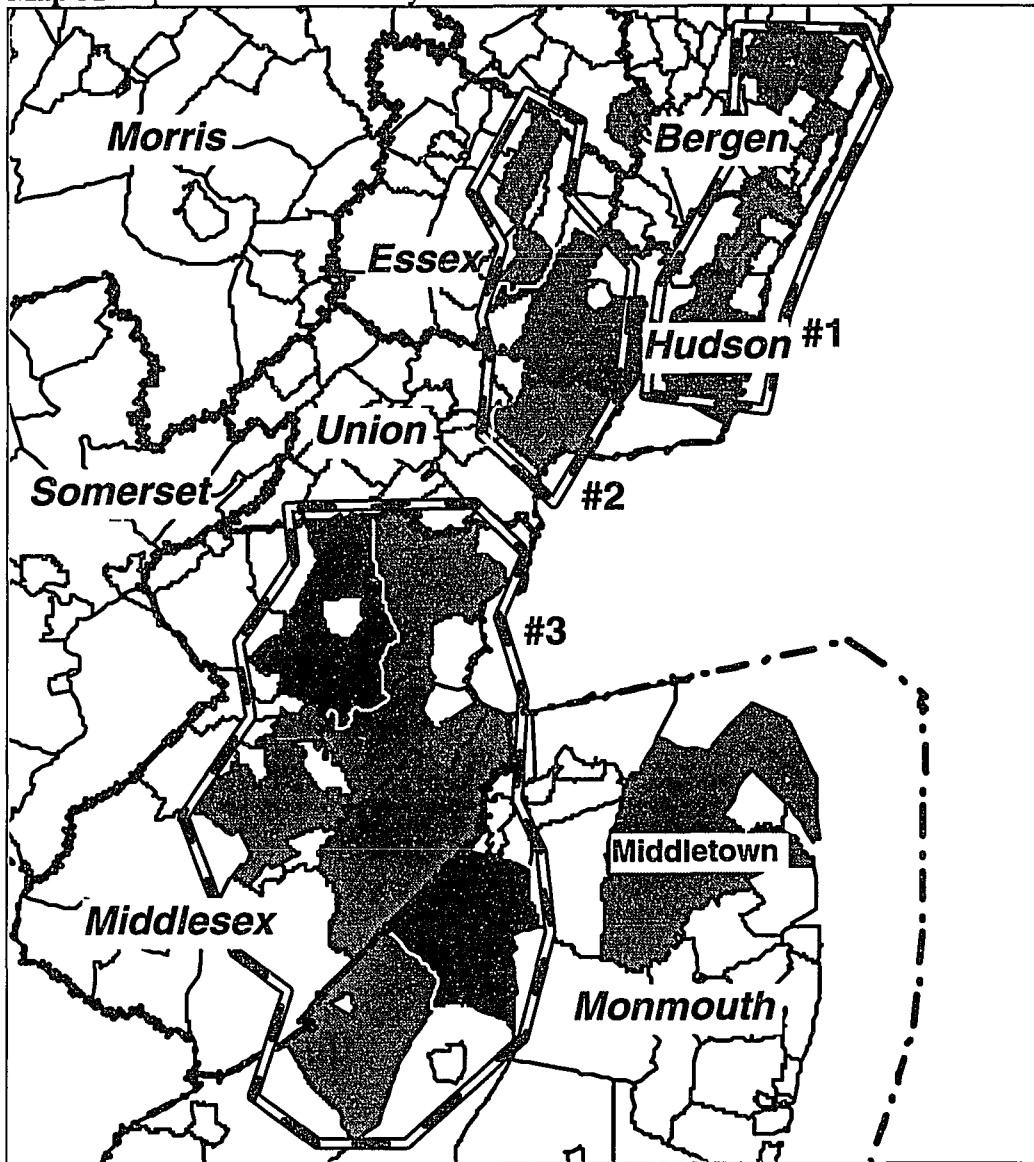
Three corridors, as demonstrated in Map 31, contained three corridors that had potential for new transit service. The first corridor could be called the Bergen/Hudson corridor. Since all of these municipalities have transit to Manhattan, the only real improvement might be to provide a ferry that connected the Hoboken Terminal with Brooklyn. The need for these commuters to pass through Manhattan would be eliminated.

The second corridor included Passaic, Essex, and Union Counties. All five municipalities had commuter routes available. This corridor could improve access to Brooklyn by utilizing the commuter rail network to Hoboken Terminal and transferring to a ferry service to Brooklyn.

The third corridor included the Monmouth/ Middlesex corridor. To improve the commute from this corridor, express buses to the Port Authority Bus Terminal could enter Manhattan through the Holland Tunnel and proceed to a Brooklyn bound subway station, and then continue uptown to the Port Authority Bus Terminal. Another possibility is to have a bus loop through Wall Street and exclusively serve the Lower Manhattan



**Map 31 Trips Enroute to Brooklyn**



Source: New Jersey Census Transportation Planning Package, 1990

commuters and Brooklyn commuters. The West Fourth Street station would be a good transfer point to the New York City Subway System, since the D and A trains serve this station and travel through the largest CBD of Brooklyn (Flatbush and Atlantic Avenues). If a transfer point was provided closer to Brooklyn, such as the West Fourth Street station, travel time for the central Monmouth County commuter would be greatly reduced. Table 19 contains the following information:

**Corridor:** Refer to the Map 31

**Trips Attracted:** Total trips attracted along a given corridor.

**Origins:** List of municipalities that formed the corridor.

**Table 19** New Transit Corridors for Brooklyn

<b>Corridor</b>	<b>Trips Attracted</b>	<b>Origins</b>
1	1,877	Teaneck, Englewood, Fort Lee, North Bergen, Union City and Jersey City.
2	894	Passaic City, Montclair, East Orange, Newark, and Elizabeth.
3	1,422	Manalapan, Marlboro, Old Bridge, East Brunswick, Sayreville, Edison, and Woodbridge

Source: New Jersey Census Transportation Planning Package, 1990

A final municipality with a significant number of people enroute to Brooklyn was Middletown. There was a commuter rail station and ferry line connecting Middletown with Manhattan. If the ferry service also included Brooklyn, the commute for these residents might improve.

### 5.2.3 The Manhattan Commute Pattern

There were 150,969 Manhattan bound commuters from the NJTPA region. Of the commuters, thirty-seven percent came by bus, twenty-five percent used NJ Transit's commuter rail, thirteen percent utilized the PATH system, and one percent used the Hudson River ferries. The municipalities with over one thousand commutes enroute to Manhattan were all located along rail or major bus lines. The Manhattan transit corridors matched the corridors defined in Chapter 2. By enabling the Manhattan commuters to use express buses to access the Lower Manhattan region would be an improvement to the existing system. This was the same solution proposed for the Brooklyn commuters. This suggestion could be carried out by connecting buses with the PATH or by looping buses through Lower Manhattan instead of terminating them at the Port Authority Bus Terminal.

### 5.2.4 The Queens Commute Pattern

As was the case for Brooklyn and the Bronx, commuters had to travel through Manhattan to reach Queens. There was one corridor and two scattered municipalities of Queens bound commuters. Table 20 lists the statistics pertaining to Queens:

**Table 20** Queens Statistics

Total Commute to Queens	5,105
Percentage that used the bus	15%
Percentage that used the rail	10%
Percentage that used PATH & NYC Subway System	7%
Total Percentage who used Transit	32%

Source: New Jersey Census Transportation Planning Package, 1990

One major corridor started in Paterson and proceeded east through Hackensack, Teaneck, and Englewood, then headed south through Fort Lee, North Bergen, Union City, Hoboken, and Jersey City. There was a total of 1,444 commuters from these municipalities. All nine municipalities had transit access to Manhattan, which required a transfer to the New York City Subway System to reach Queens. There were few options to improve this commuting situation.

Two additional municipalities were Edison and Newark which had 369 Queens bound commuters. These two municipalities were located along NJ Transit's Northeast Corridor. The possibility of extending service through Penn Station into Queens and Long Island has been proposed by NJ Transit. Nevertheless, a simpler solution would be to schedule NJ Transit trains to arrive across the platform from Long Island Rail Road trains enroute to Jamaica for the morning commute and vice versa for the evening commute. That would provide for an easy transfer and minimal loss of travel time.

### 5.2.5 The Staten Island Commute Pattern

Staten Island had three direct connections with New Jersey. It is possible to travel to Staten Island without passing through Manhattan. There were two corridors of commuters enroute to Staten Island and one municipality with over one hundred commuters on a daily basis. Table 21 lists the statistics for Staten Island.

**Table 21** Staten Island Statistics

Total Commute to Staten Island	4,970
Percentage that used the bus	3%
Percentage that used PATH & NYC Subway System	2%
Total Percentage who used Transit	6.6%

Source: New Jersey Census Transportation Planning Package, 1990

There were two corridors involved with the Staten Island commute. The first corridor had no direct bus service to Staten Island. A potential new transit service could connect the municipalities listed in Table 21 with the Victory Avenue corridor in Staten Island via the Goethals Bridge. The Teleport, several retail shops, and office buildings were located along Victory Avenue.

The second corridor was the Jersey City/ Bayonne corridor. A possible transit line could run down the center of these municipalities along Kennedy Boulevard, continue over the Bayonne Bridge, and follow Victory Avenue from the Teleport to Boro Hall. Table 22 listed the two major corridors of travel between the NJTPA region and Staten Island

**Corridor:** Refer to Map 33.

**Trips Attracted:** Total trips attracted along a given corridor.

**Origins:** List of municipalities that formed the corridor.

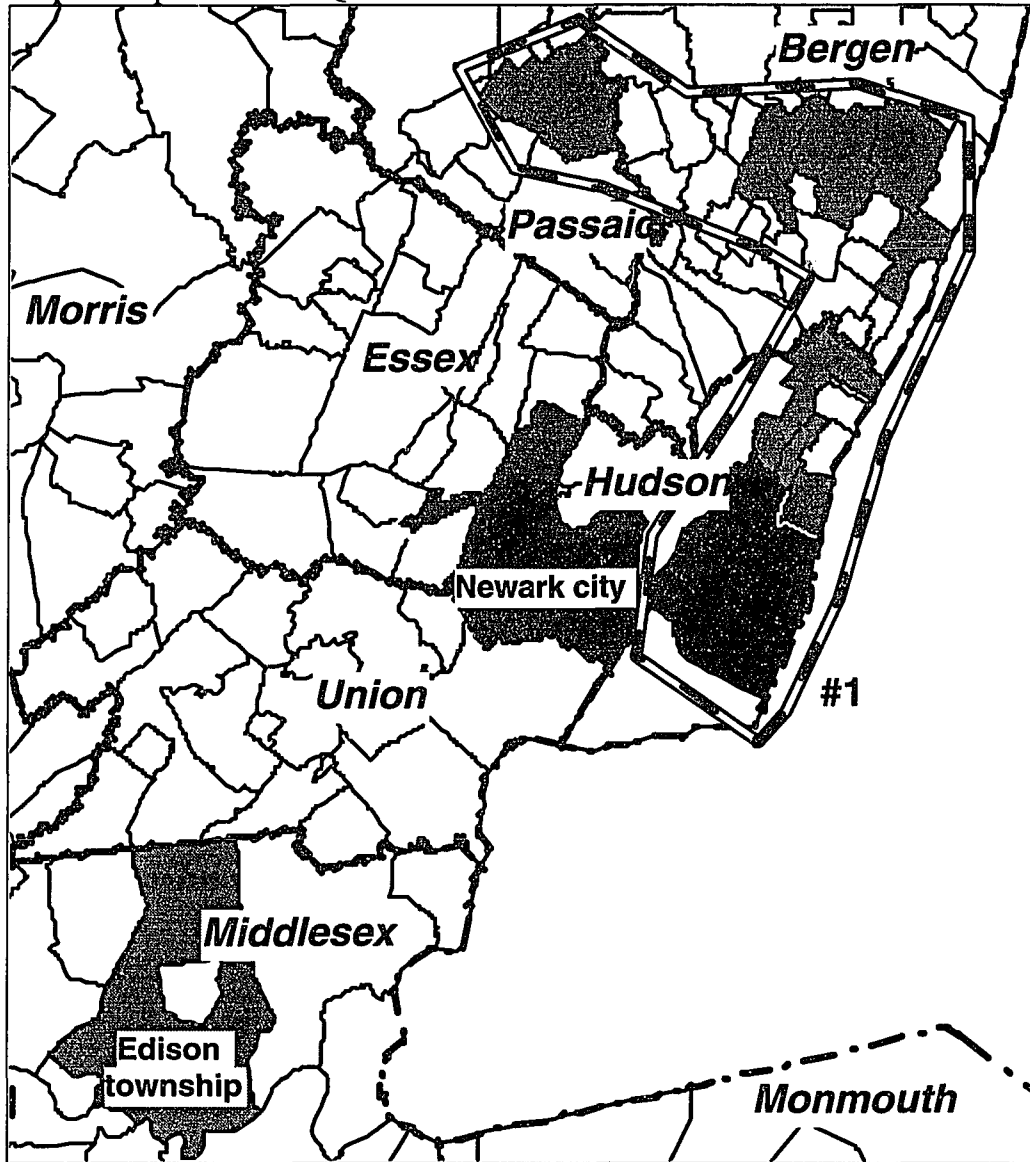
**Table 22** New Transit Corridors for Staten Island

<b>Corridor</b>	<b>Trips Attracted</b>	<b>Origins</b>
1	1,171	Manalapan, Old Bridge, Sayreville, East Brunswick, Edison, and Woodbridge
2	376	Jersey City, Bayonne

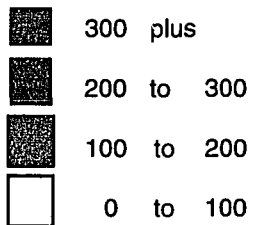
Source: New Jersey Census Transportation Planning Package, 1990

A high volume of Staten Island bound commuters came from Middletown. Since Middletown is located just east of the first corridor described, a bus spur connecting it to the first corridor would be the most feasible. Another possibility would be to offer ferry service to the Staten Island Ferry Terminal.

Map 32 Trips Enroute to Queens

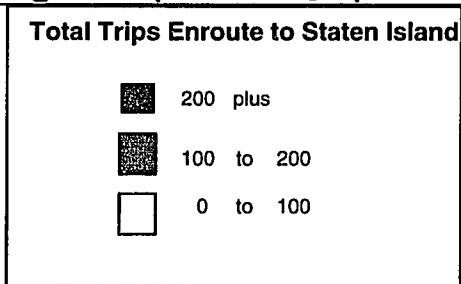
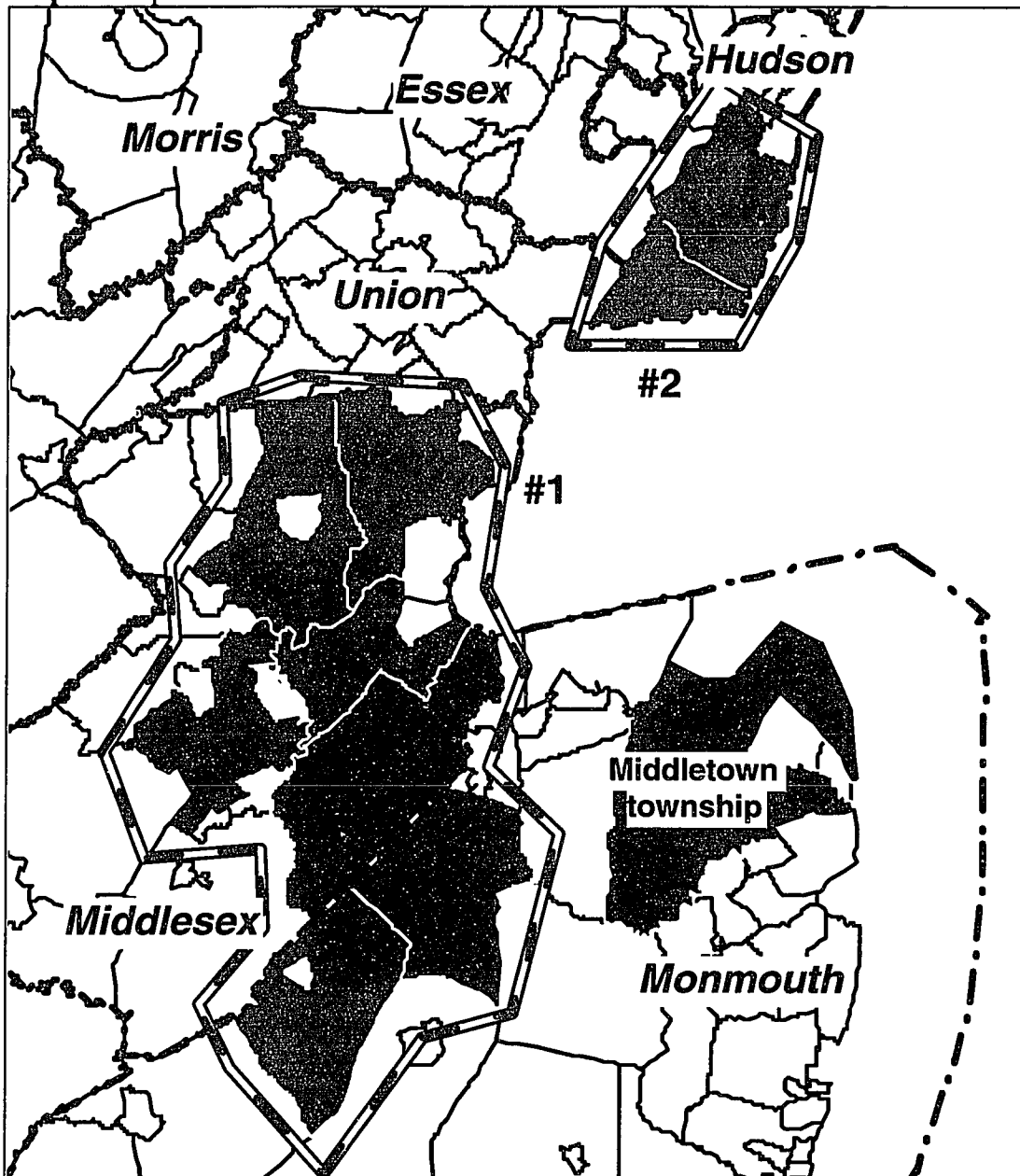


**Total Trips Enroute to Queens**



Source: New Jersey Census Transportation Planning Package, 1990

Map 33 Trips Enroute to Staten Island



Source: New Jersey Census Transportation Planning Package, 1990

### 5.3 The Trenton Commute

Trenton has an extensive bus system serving the adjacent municipalities and NJ Transit's Northeast Corridor Line. The statistics for Trenton are listed in Table 23.

**Table 23** Trenton Statistics

Total Commute to Trenton	3,531
Percentage that used the bus	.2%
Percentage that used the rail	6%
Percentage that used PATH & NYC Subway System	0%
Total Percentage who used Transit	6.6%

Source: New Jersey Census Transportation Planning Package, 1990

There were three distinct corridors from which 48% of the Trenton bound commuters originated from the NJTPA region. Map 34 shows the corridors accessing Trenton, while Table 24 lists the corridors with the following information.

**Corridor:** Reference number to Map 34.

**Trips Attracted:** Total trips attracted along a given corridor.

**Origins:** List of municipalities that formed the corridor.

**Table 24** New Transit Corridors for Trenton

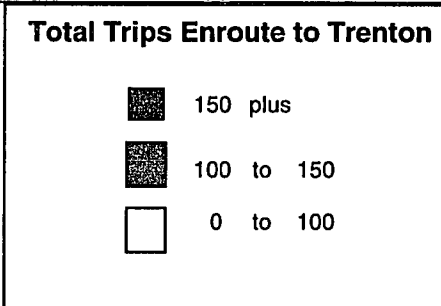
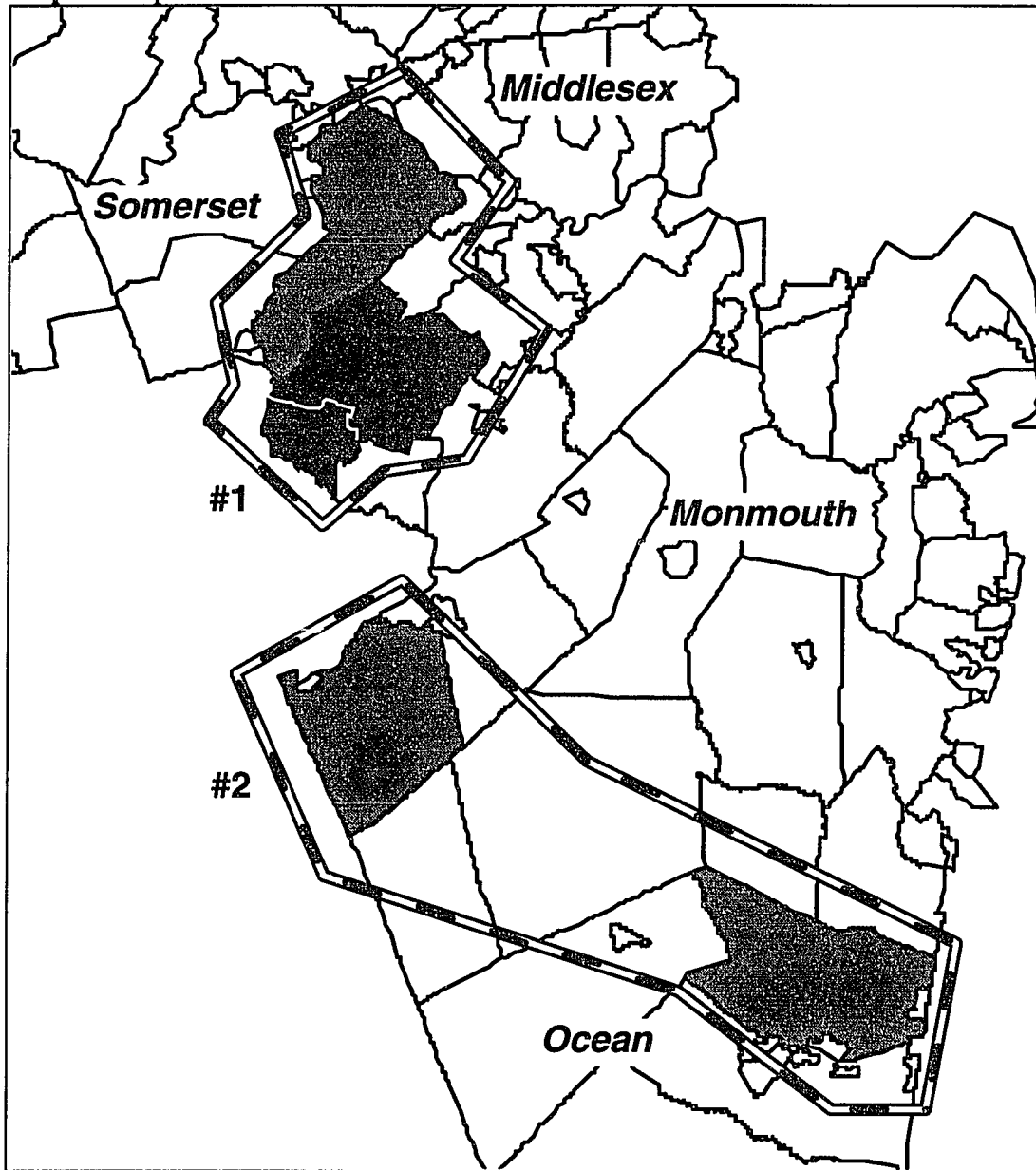
Corridor	Trips Attracted	Origins
1	471	Franklin, South Brunswick, and Plainsboro
2	213	Dover and Upper Freehold

Source: New Jersey Census Transportation Planning Package, 1990

For the first corridor, commuters from Franklin could easily access the commuter rail line. Plainsboro and South Brunswick are located between stations along the



Map 34 Trips Enroute to Trenton



Source: New Jersey Census Transportation Planning Package, 1990

Northeast Corridor Line, although Plainsboro has a bus line enroute to Trenton. This left South Brunswick with no transit service. A possible solution could be to extend the Plainsboro bus line north into Monmouth Junction, located in the heart of South Brunswick.

The second corridor extended east to the Atlantic Ocean. There was no transit service between this corridor and Trenton. Since many of the western municipalities within this corridor have very low densities, park and ride lots would need to be strategically located to attract riders. A bus route could be successful if park and ride lots were built along I-195, with buses operating along the interstate.

#### **5.4 Concluding Remarks**

Chapter 5 analyzed the five boroughs of New York in addition to Trenton for potential transit service in the NJTPA region. The largest commute was to Manhattan, with the current transit service provided access to all NJTPA origins. The smallest commute was to Trenton. On the other hand, places like Queens, Brooklyn, and the Bronx had a moderate volume of trips. There was no direct way of accessing the three boroughs without passing through Manhattan or Staten Island. In total, there were eight new corridors found by examining the maps produced.

## **CHAPTER 6**

### **CONCLUSION**

As described in Chapter 2, ten transit corridors were proposed for the NJTPA region. The corridors were created based on the locations of NJ Transit's commuter rail network and bus network. These corridors were analyzed by calculating the total number of commuters living within the corridor compared to the total number of jobs. For the majority of the corridors, it was concluded that the number of jobs exceeded the number of commuters from the corridor. Once the ten corridors were defined, Chapter 3 examined the steps taken to reduce the total number of municipalities from the original 384 municipalities to twenty-four. The twenty-four municipalities were then analyzed as origin points. Based on the same information, their destinations were mapped in Chapter 4. Based on the frequency of trips to the same destinations, three municipalities with the highest frequency of trips attracted were chosen to be analyzed. These three destinations were considered the largest CBD's within the NJTPA region. The municipalities that produced trips to these three municipalities were then mapped. In Chapter 5, the five boroughs of New York and Trenton were analyzed as destination points. The origin points were the residences, within the NJTPA region, of the New York and Trenton bound commuters.

After the study was completed, it was concluded that two municipalities in the NJTPA region had the potential for new bus or rail services. The two municipalities were

Edison and Parsippany-Troy Hills. Three major transit corridors were delineated in Edison. One of the corridors could be accessed by the proposed MOM Rail Line. If this rail line were constructed, a significant amount of commuters enroute from Monmouth, Middlesex, and Ocean to Edison would be serviced. Five transit corridors were identified in Parsippany-Troy Hills, with the Morris & Essex Line and Boonton Line servicing the municipality. If bus service were expanded to connect the rail lines with the major places of employment, Parsippany Troy-Hills would be serviced by transit.

Between the five boroughs of New York City and the NJTPA region, eight interstate corridors were identified. Manhattan bound commuters had access to both bus and rail transit. The NJ Transit network was designed to connect suburban New Jersey communities with the two CBD's of Manhattan, Midtown and Downtown. Commuters enroute to either Brooklyn, Queens or the Bronx had to pass through Manhattan. Staten Island, on the other hand, had direct access to the NJTPA region, thus making it possible for a bus service to directly link the business districts of Staten Island with the NJTPA region. Two corridors were proposed between Trenton and the NJTPA region. Trenton mostly attracted residents from the southern part of the NJTPA region and the I-195 corridor.

The relationship between corridors and CBDs is analogous to a bicycle wheel; with the spokes representing the corridors and the hub representing the specific CBD. Following an analysis of commuter patterns of twenty-four municipalities within the NJTPA region, three CBDs and eight corridors were identified. Six CBDs and nine corridors for the five boroughs of New York and their commuter patterns to the NJTPA

region were identified. It was concluded that Trenton had one CBD and two corridors connecting to the NJTPA region. A total of seventeen corridors have been proposed in the area of study. Understanding the relationship between the proposed corridors and the CBDs in the NJTPA region is critical prior to any implementation of new bus and rail lines.

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