

Prepared for: Somerset County Planning Board, New Jersey Middlesex County Planning Board, New Jersey

Prepared by:



In association with: Alan M. Voorhees Transportation Center (Rutgers University) Nelson/Nygaard Consulting Associates Looney Ricks Kiss QualQuan Insights, Inc.

June 16, 2005

The preparation of this study has been financed in part through funds from the U.S. Department of Transportation, Federal Highway Administration, under the Federal Highway Act of 1956, as amended. This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The contents do not necessarily reflect the official views or policies of the Federal Transit Administration, the Federal Highway Administration, of the State of New Jersey. This study does not constitute a standard, specification or regulation.

1.0 EXECUTIVE SUMMARY	1
1.1 Overview	1
1.2 PUBLIC INVOLVEMENT	1
1.3 ISSUES AND STRATEGIES	2
1.3.1 Transit Services	2
1.3.2 Travel Demand Management	3
1.3.3 Smart Growth Land Use and Transit Friendly Design	4
1.3.4 Pedestrian and Bicycle	5
1.3.5 Wayfinding Signage	6
1.3.6 Intelligent Transportation Systems	1
2.0 INTRODUCTION	8
2.1 BACKGROUND	8
2.2 Study Area	8
2.3 PUBLIC INVOLVEMENT	9
2.4 GOAL AND OBJECTIVES	10
3.0 EXISTING CONDITIONS AND ANALYSIS	12
3.1 TRAFFIC CONDITIONS	12
3.2 JOURNEY TO WORK ANALYSIS	13
3.3 COMMUNITY SURVEYS	21
3.3.1 Resident Survey	21
3.3.2 Worker Survey	26
3.3.3 Employer Survey	33
4.0 TRAVEL DEMAND MANAGEMENT	36
4.1 INTRODUCTION	36
4.2 TYPICAL TDM STRATEGIES AND PROGRAMS	36
4.2.1 Alternatives to Driving Alone	36
4.2.2 Alternative Work Arrangements	38
4.2.3 Financial Incentives	38
4.2.4 Parking Management Programs	39
4.2.5 Land Use Initiatives	39
4.2.6 Supporting Programs	40 40
4.3 COMMUNITY SURVEY RESULTS	+Z
4.4 EXPANDING THE USE OF TOWIN THE STUDY AREA	+4 15
	40
5.0 TRANSIT CONDITIONS AND STRATEGIES	łð
5.1 INTRODUCTION	18
5.2 EXISTING CONDITIONS	18 10
J.Z. I Transit Services	₩ 10
5.2.2 Lanu USE	57 57
5.3 ALTERNATIVES ANALYSIS	58

TABLE OF CONTENTS

5.4 CONCLUSIONS	63 65
6.0 SMART GROWTH LAND USE AND TRANSIT-FRIENDLY DESIGN	
6.1 INTRODUCTION	
6.2.1 Transportation Systems	
6.2.2 Land Use	75 75
6.3. SMART GROWTH PLANNING AUDIT	70 78
6.3.1 Piscataway Township	70 78
6.3.2 Franklin Township	
6.4 COMMUNITY SURVEY RESULTS	
6.5 Strategies	85
7.0 PEDESTRIAN AND BICYCLE FACILITIES	99
7.1 INTRODUCTION	99
7.2 EXISTING CONDITIONS	99
7.2.1 Existing Pedestrian Facilities	99
7.2.2 Existing Bicycle Facilities	
7.2.3 Easton Avenue	
7.2.4 Pedestrian and Bicycle Activity	
7.2.5 Land Development Ordinances	
7.2.0 Selection of Roadways for Pedestrian and Bicycle Facilities	104
7.2.7 Delaware-Rantan Canar	
8.0 WAYFINDING SIGNAGE	120
8.1 INTRODUCTION	120
8.2 EXISTING CONDITIONS	120
8.2.1 Crash Analysis	120
8.2.2 Signage	121
8.3 Strategies	122
8.4 Additional Signing Evaluation	124
9.0 INTELLIGENT TRANSPORTATION SYSTEMS	125
9.1 INTRODUCTION	125
9.2 EXISTING CONDITIONS	125
9.2.1 Organizations	125
9.2.2 Data Collection	126
9.2.3 Arterial Management	
9.2.4 Incident Management	
9.2.0 I raveler information	
J.J JIKATEGIES	
10.0 OTHER ISSUES	134
11.0 IMPLEMENTATION MATRIX	135

12.0	PENDIX
-------------	--------

TABLE OF CONTENTS – TABLES

Table 3.1: Total Workers in Franklin and Piscataway Townships	.14
Table 3.2: Top Origin Tracts for Tract 535.02	.17
Table 3.3: Top Origin Tracts for Tract 7.02	.18
Table 3.4: Top Origin Tracts for Tract 535.01	19
Table 3.5: Top Origin Tracts for Tract 6.03	19
Table 3.6: Total Employed Residents in Franklin and Piscataway Townships	20
Table 3.7: Resident Opinions of Traffic Conditions in the Interchange Area	22
Table 3.8: Resident Opinions Related to Transit	22
Table 3.9: Resident Opinions Related to Walking and Sidewalk Conditions	23
Table 3.10: Purposes For Which Residents Would Consider Bicycling	24
Table 3.11: Resident Opinions Related to Locations Where Sidewalks and/or Bike Facilities a	are
Needed	24
Table 3.12: Resident Support for Various Smart Growth Strategies	26
Table 3.13: Worker Opinions of Traffic Conditions in the Interchange Area	27
Table 3.14: Mode Options Workers are Willing to Consider	28
Table 3.15: TDM Strategies and Programs Currently Offered by Study Area Employers	28
Table 3.17: Worker Opinions Related to Transit	29
Table 3.18: Worker Opinions Related to Walking and Sidewalk Conditions	30
Table 3.19: Worker Opinions Related to Locations Where Sidewalks and/ or Bike Facilities a	are
Needed	31
Table 3.20: Worker Support for Various Smart Growth Strategies	32
Table 3.21: Employer Opinions of Traffic Conditions in the Interchange Area	33
Table 3.22: TDM Strategies and Programs Currently Offered by Study Area Employers	34
Table 3.23: Employer Opinions Related to Transit	.35
Table 4.1: Travel Demand Management Implementation Matrix	41
Table 4.2: Mode Options Workers are Willing to Consider	42
Table 4.3: TDM Strategies and Programs Currently Offered by Study Area Employers	42
Table 4.4: TDM Strategies and Programs Currently Offered by Study Area Employers	.44
Table 5.1: Existing Transit Services	.50
Table 5.2: Study Area Land Uses	55
Table 5.3: Evaluation of Criteria for Alternatives Analysis	.58
Table 5.4: Commuter Rail Options	.59
Table 5.5: Light Rail Options	60
Table 5.6: Bus Rapid Transit Options	.61
Table 5.7: On-Street Bus Options	.62
Table 5.8: Pedestrian and Bicycle Network Options	63
Table 5.9: Bus Complements	63
Table 5.10: Evaluation Summary	.64
Table 5.11: Existing Bus/Train Connections (New Brunswick Railroad Station)	71
Table 5.12: Existing Bus/Train Connections (Bound Brook Railroad Station)	72
Table 5.13: Bus Service Complements	73

Table 6.1:	Study Area Land Use	76
Table 6.2:	Parking Utilization at Selected Sites in Piscataway Township	79
Table 6.3:	Parking Utilization at Selected Sites in Franklin Township	82
Table 6.4:	Resident Support for Various Smart Growth Strategies	83
Table 6.5:	Worker Support for Various Smart Growth Strategies	84
Table 6.6:	Transit Compatible Densities	95
Table 7.1.	Resident Survey Results: Locations where Sidewalks and/or Bike Facilities are	Needed
		105
Table 7.2.	Worker Survey Results: Locations Where Sidewalks and/or Bike Facilities are	Needed
		105
Table 7.3.	Comparison of Potential River Crossings	118

TABLE OF CONTENTS – FIGURES

Figure 2.1: Study Area	11
Figure 3.1: Workers Commuting to Census Tract 535.02	15
Figure 3.2: Workers Commuting to Census Tract 7.02	16
Figure 5.1: Existing Transit Services	49
Figure 5.2: Population Density and Key and Employment Locations	56
Figure 5.3: Proposed Transit Services	66
Figure 6.1 Study Area Land Uses	77
Figure 6.2: Traditional grid pattern vs. typical suburban street layout	86
Figure 6.3: Existing Franklin Township "Superblock"	88
Figure 6.4: Retrofitted Franklin Township "Superblock" – Enhanced Connectivity Plan	89
Figure 6.5: Strategic In-Fill Development – Retail/ Restaurant Uses	92
Figure 6.6: Strategic In-Fill Development – Transit-Supportive Residential	93
Figure 6.7: Full-Scale Redevelopment	94
Figure 7.1: Presence of Sidewalks	100
Figure 7.2: Existing and Planned Bicycle Facilities	102
Figure 7.3: Priority Sidewalks	109
Figure 7.4: Potential Bike Network	112

1.0 EXECUTIVE SUMMARY

1.1 Overview

The I-287 Mobility Plan provides recommendations to manage travel demand in the area of the I-287 interchanges with Easton Avenue in Franklin Township, Somerset County; and River Road in Piscataway Township, Middlesex County. The I-287 Mobility Plan is a follow-up study to the *I-287 Easton Avenue/ River Road Interchange Planning Study*, completed in September 2003.

This Plan was commissioned by Somerset County and Middlesex County, and was conducted by the transportation planning firm Orth-Rodgers & Associates, Inc., in association with the Alan M. Voorhees Transportation Center at Rutgers University; Nelson/Nygaard Associates; Looney Ricks Kiss; and QualQuan Insights. The study lasted from April 2004 to June 2005. Strategies are applicable to the entire study area, which consists of the northern half of Franklin Township, and virtually all of Piscataway Township.

The Mobility Plan is organized into six different plan "elements":

- Transit Services
- Travel Demand Management (TDM)
- Smart Growth/ Transit-Friendly Design
- Pedestrian/ Bicycle
- Intelligent Transportation Systems (ITS)
- Way-Finding Signage

1.2 Public Involvement

The plan development process included a significant public involvement process that solicited stakeholder and public input through a variety of forums. Significant components of the public involvement process included:

Steering Committee. A steering committee was established to provide overall direction for the study. This group consisted of a broad cross-section of township and county officials, township and county personnel, as well as representatives from the New Jersey Department of Transportation (NJDOT), the North Jersey Transportation Planning Authority (NJTPA), NJ TRANSIT, the Delaware & Raritan Canal Commission, Rutgers University, Ridewise of Somerset County, and Keep Middlesex Moving, Inc. The steering committee provided important input relative to shaping the implementation strategies recommended in the plan. Four meetings were held throughout the course of the study.

Focus groups. A series of stakeholder focus groups were conducted with key constituencies. These focus groups were held early in the study process to help the study team to better understand important issues related to each plan element and to provide input on strategies that should receive the greatest attention from the study team. One meeting was held for each of the following five groups:

- State and County Officials
- Transit Providers and TMAs
- Businesses
- Franklin Township Officials

• Piscataway Township Officials

Community Surveys. A series of internet-based surveys of study area residents, workers and employers were conducted. The purpose of the surveys was to help decision makers understand better how local traffic conditions affect residents, workers and employers in the area. Approximately six hundred individuals responded to the survey, providing input related to each of the plan elements.

Technical subcommittees. Four technical subcommittees were convened to review data and analysis results and to discuss potential implementation strategies in detail. Subcommittee members were drawn from the membership of the steering committee. Meetings were held late in the study, to evaluate and refine initial strategies proposed by the study team to address issues raised in the focus groups. The technical subcommittees were organized according to the following topical areas:

- Pedestrian/ Bicycle
- ITS/ Wayfinding Signage
- Transit/ TDM
- Smart Growth

Two rounds of technical subcommittee meetings were held, for a total of eight meetings.

Public Information Sessions. Two public information sessions were conducted. The first session was held at the beginning of the plan development process to introduce the broader public to the study and to discuss potential mobility plan goals and objectives. The second was held at the end of the study to present the preliminary agenda of implementation strategies recommended in the plan.

1.3 Issues and Strategies

The following section summarizes the key issues and strategies identified in each plan element.

1.3.1 Transit Services

Issues:

There are a limited number of transit services available in the study area, and ridership is currently low. Existing services lack visibility and are not marketed well. Only about half of the residents and workers that participated in the community surveys reported being aware that the services were available. Existing services operate with limited frequency and operating times are either inadequate or inconvenient to meet the travel needs of many potential users. In addition, there are few, if any sidewalks and transit amenities such as bus stop signs and shelters located within the study area. Finally, existing development lack transit-friendly characteristics. For example, land uses are generally low density; development districts are single use; there are few connections between adjacent properties; building setbacks are large; parking is abundant and free; and buildings are not designed and oriented to facilitate pedestrian activity or transit use.

Strategies:

1. Implement modifications to existing shuttle routes to serve more destinations.

2. Add new shuttle routes to serve areas not currently served by existing routes.

- 3. Modify existing schedules to include more frequent service, additional service runs to accommodate shift workers and to connect better with other transit services, especially trains arriving and departing from the New Brunswick and Bound Brook rail stations.
- 4. *Implement bus service complements to increase the visibility of existing services.* Bus service complements should include the installation of bus stop signs and shelters, posted schedules and rout maps, better marketing materials and easier access to service information via the Internet.

1.3.2 Travel Demand Management

Issues:

Based on stakeholder input from the business community and local officials and results from the community surveys, it appears that the use of TDM strategies and programs in the study area is currently very limited and is likely to remain that way for the foreseeable future. Ninety-six percent of workers and residents surveyed reported driving alone to work. This is due to a variety of reasons, which include but are not limited to the following:

- There are few meaningful financial incentives for employers or employees to sponsor or participate in TDM programs;
- The study area contains a diverse employer base which includes many smaller businesses;
- Today's workforce is very mobile, with many individuals splitting time between multiple worksites
- Currently, there is a high office vacancy rate;
- Work locations in the study area are often satellite offices or part of larger multinational corporations, so, fewer employers in the study area make employee benefit decisions at their local work site. Decisions are made a headquarter office located elsewhere; and
- The layout of existing development and general lack of pedestrian, bicycle and transit infrastructure discourage the use of commute options.

- 1. Increase financial and other incentives to employers to create and promote TDM programs and to employees to use commute options.
- 2. *Target TDM outreach efforts directly to employees and residents.* Use "social marketing" and "individualized marketing" techniques to increase the effectiveness of outreach efforts.
- 3. Increase coordination related to TDM planning and promotion. Coordination efforts should include municipal, county and regional economic development agencies; business associations; chambers of commerce; elected and appointed officials; and TMA's.
- 4. Encourage the use of TDM strategies as part of the local land development process. This can be done through ordinance revisions that require transit-friendly design and the provision of bicycle and pedestrian facilities and amenities as part of the site development process; passage of voluntary or mandatory trip reduction ordinances; and negotiating travel demand management agreements with developers and/or property owners.
- 5. Increase the viability of alternative transportation modes by fostering transportation-efficient development, enhancing and expanding transit options and improving conditions for walking and bicycling.

1.3.3 Smart Growth Land Use and Transit Friendly Design

Issues:

The study area is characterized by generally low density, single use development. There are few connections within and between districts, including many no-outlet streets and driveways. There are very few sidewalks and bicycle facilities and the study area roadway network follows a typical suburban hierarchy of streets with traffic funneling onto a limited number of collector and arterial roadways. Building setbacks are large; parking is abundant and free; and buildings are not designed and oriented to facilitate pedestrian activity or transit use. Although there is little emphasis on smart growth practices and transit-friendly design principles in township master plans, zoning codes or land development ordinances, there appears to be significant public support for smart growth concepts. Of particular note is the number of residents that expressed support or strong support for locating new buildings close to the street with parking in the rear (78%); making sure building fronts are oriented to the street (91%); encouraging mixed-use development (77%), retrofitting existing developed areas with a mix of land uses (81%), as well as the overwhelming support expressed for strategies designed to improve conditions for pedestrians and transit users.

- 1. Adopt comprehensive circulation plans that fully address all modes of transportation, not just roads. Circulation plans should also address the needs of all user groups, including: young people, seniors, and those of cannot or choose not to drive.
- 2. Increase connectivity for all modes of travel within and between districts and properties. Both townships should plan and construct new roadway connections between existing arterials to reduce overall block size, reconnect "no outlet" streets and increase route choice for motorists, transit vehicles, bicyclists and pedestrians. Municipal ordinances should be amended to limit future cul-de-sacs and no outlet streets in favor of an interconnected network of streets; establish block-size maximums; and require a continuous network of sidewalks and pathways for pedestrians and bicyclists, including well-designed and maintained cross-walks. Where ever feasible, new pedestrian and bicycle facilities should be constructed to connect existing residential neighborhoods to one another and adjacent commercial districts.
- 3. Encourage a greater mix of uses in non-residential districts. New complementary uses such as retail, restaurant and entertainment uses as well as moderate to high density residential uses should be added in targeted locations. This could be accomplished by planning for strategic infill development and/or comprehensive redevelopment in targeted locations. The use of transfer of development rights should be explored.
- 4. Adopt design standards and guidelines to enhance the built environment, promote walking and biking and encourage transit-friendly development.
- 5. Revise parking standards to encourage trip reduction and the use of commute alternatives.
- 6. Consider the creation of "Special Improvement Districts" to encourage business development, support infrastructure enhancements such as the installation of sidewalks and streetscape amenities and provide funding for additional transit services.
- 7. Encourage community and stakeholder involvement as part of any smart growth planning *initiative.* "Smart" public involvement should be open, transparent, inclusive and responsive.

1.3.4 Pedestrian and Bicycle

Issues:

Very few persons currently employed within the study area bicycle or walk to walk. Since there are 18,600 persons who live within five miles of their workplace, the potential exists to greatly increase the current number of those who bicycle to work. It will be more difficult to substantially increase the number who walk, but the presence of sidewalks will also make it more convenient for people to use transit services.

There are very few sidewalks in the study area currently, and virtually none in the industrial and office districts that comprise the heart of the study area. In some locations where sidewalks are present, such as Easton Avenue, they are poorly maintained, and missing links mitigate their effectiveness. The land development ordinances for both townships do not specifically require the installation of sidewalks as part of site plan approvals.

Several roadways in the study area accommodate bicycle lanes, and multi-use paths are also present in several locations.

Via the I-287 web survey, residents and workers identified locations where sidewalks and bicycle facilities should be installed. In the residents' survey, top choices included Easton Avenue, Cedar Grove Lane, Amwell Road, and Demott Lane in Franklin Township; and River Road, Metlars Lane and Centennial Avenue in Piscataway Township. In the workers' survey, top choices included Davidson Avenue and Pierce Street in Franklin Township, and Centennial Avenue and River Road in Piscataway Township.

- 1. Prepare and adopt municipal-wide pedestrian plans.
- 2. Amend municipal ordinances to require the installation of sidewalks as part of site plan approval. The Mobility Plan recommends model ordinance language requiring sidewalks for new construction. It also recommends requiring the installation of sidewalks for existing sites, under the following conditions: remodeling or renovating 10% of the site, expanding the building by 10%, or changing the use to one with greater pedestrian activity. Since the large majority of the study area has been developed, requiring sidewalks only for new uses will impede creation of a pedestrian network.
- 3. *Install sidewalks along high priority corridors.* If either Township seeks NJDOT Local Aid funding for sidewalks, or allocates municipal funding for sidewalks, efforts should be concentrated upon the identified roadway links.
- 4. Implement pedestrian facility improvements at key intersections and mid-block crossings within the study area.
- 5. *Prepare, adopt and implement comprehensive bikeway plans.* Franklin Township has an adopted plan, and should continue to implement it; Piscataway needs to approve a comprehensive plan and proceed with implementation.
- 6. Promote bicycling through distribution of bikeway maps.

- 7. Provide sidewalk and bikeway connections to areas outside the study area. Recommendations were made only for the study area; connections need to be made to roadways outside the study area to be more effective.
- 8. *Improve access to Delaware & Raritan Canal.* Greater awareness of canal access points, and a greater number of canal access locations, could increase use by commuters.
- 9. Consider new pedestrian-bicycle bridge crossing of Raritan River and D&R Canal. This would be the most ambitious and expensive means of encouraging regional bicycle trips. Further study is needed.
- 10. *Extend the Johnson Park Bikeway*. Middlesex County is proposing to extend a bikeway from Hoes Lane to the train station in Bound Brook Borough, and this effort should be encouraged.
- 11. Use innovative mechanisms to fund construction of sidewalk and bicycle improvements. Matching grants can help expedite construction of these facilities.
- 12. Prepare and adopt maintenance plans for pedestrian and bicycle facilities. Municipal involvement does not end with construction of these facilities; regular plowing, sweeping and other maintenance is needed.

1.3.5 Wayfinding Signage

Issues:

Wayfinding signage should direct motorists to their destination using appropriate roadways, in the most efficient manner, with the least confusion and following the safest route. As part of the I-287 Interchanges Planning Study, a high number of crashes had been identified in the area of Interchange 10. That study had thus recommended on concentrating upon the roadways in this area for wayfinding signage recommendations.

- 1. *Revise signage for I-287 southbound motorists exiting in Franklin Township*. In the future, all motorists southbound on I-287 heading to destinations on Davidson Avenue or Atrium Drive should be directed to continue southbound on Easton Avenue, and to turn right onto World's Fair Drive.
- 2. Install signing to direct Franklin Township hotel district visitors to I-287. Once visitors are directed to access all hotels via World's Fair Drive, signage should be installed to direct them back to I-287 via Davidson Avenue.
- 3. Remove unauthorized signage from Easton Avenue.
- 4. Revise signage for hotels in Piscataway Township. Northbound motorists on I-287 should be directed to Piscataway hotels via Interchange 8, rather than Interchange 9.
- 5. Revise signing for truck weigh station on northbound I-287. A sign indicating whether the weigh station is open or closed should be posted one mile in advance of the station.

1.3.6 Intelligent Transportation Systems

Issues:

There are currently no ITS applications in the study area. Technologies such as the TRANSMIT system (a program involving the installation of EZ Pass tag readers to detect ambient traffic speeds) offer potential for providing better information on travel conditions to both local motorists and motorists passing through the area. In turn, motorists will be able to make better informed decisions on which routes to use, or at what times to travel. The use of ITS technologies can also help improve the response to incidents. Because there are relatively few signalized intersections in the study area, there are limited opportunities for using ITS to improve traffic flow through such means as coordinating signals. In New Jersey, the major agencies involved in ITS applications include the New Jersey Department of Transportation Traffic Operations Center (NJDOT TOC) and TRANSCOM, a consortium of 16 major transportation agencies in the metropolitan area.

- 1. Coordinate new data collection efforts with NJDOT Traffic Operations Center and TRANSCOM. Any major data collection effort will range beyond the expertise of local and county engineering departments, and it will thus be important to coordinate with NJDOT and TRANSCOM.
- Install CCTV (Closed Circuit Television) and EZ Pass tag readers on study area roadways. These technologies should be installed on I-287 in the study area, to allow better incident detection and monitoring of traffic flow. Consideration should ultimately be given to their installation on Easton Avenue and River Road.
- 3. Investigate coordination of traffic signals on River Road. Piscataway Township and Middlesex County should investigate the potential coordination of signals on River Road with Plainfield Avenue and with Centennial Avenue.
- 4. Investigate Transit Signal Priority (TSP) for key signalized intersections in study area. Use of TSP would permit transit vehicles to run on schedule a greater percentage of time, and thus attract more riders. Use of TSP is recommended on River Road at Plainfield Avenue; New Brunswick Road at Cedar Grove Lane; Davidson Avenue at Easton Avenue; and Easton Avenue at Franklin Boulevard. Its use is also recommended for signals in downtown New Brunswick.
- 5. *Enhance incident management through installation of CCTV.* Local emergency services would significantly benefit from installation of this technology.
- Improve existing traveler information services. Greater specificity needs to be added to description of traffic conditions on NJCommuter.com website. Information on travel speeds and actual travel times can ultimately be added through widespread use of EZ Pass tag readers.

2.0 INTRODUCTION

2.1 Background

The I-287 Mobility Plan provides recommendations organized into six different strategy "elements" with the primary goal of managing travel demand in the area of the I-287 interchanges with Easton Avenue in Franklin Township (Interchange 10) and River Road in Piscataway Township (Interchange 9).

These elements are:

- Transit Services
- Travel Demand Management (TDM)
- Smart Growth/ Transit-Friendly Design
- Pedestrian / Bicycle
- Intelligent Transportation Systems (ITS)
- Way-Finding Signage

This Plan was commissioned by Somerset County and Middlesex County, and was conducted by the transportation planning firm Orth-Rodgers & Associates, Inc., in association with the Alan M. Voorhees Transportation Center at Rutgers University; Nelson/Nygaard Associates; Looney Ricks Kiss; and QualQuan Insights. Starting in April 2004 and concluding in June 2005, the study team carried out an intensive public involvement program, conducted research into ideas that emerged from the public involvement process, and finally refined these ideas into implementable strategies.

The I-287 Mobility Plan is a follow-up study to the *I-287 Easton Avenue/ River Road Interchange Planning Study*, completed in September 2003. That study identified roadway capacity and safety problems within the interchange area, and recommended a series of short and long term ramp and roadway improvements to address these problems. The most extensive improvements would involve the construction of collector/distributor roads between Interchange 8 and Interchange 10, widening and lengthening of I-287 southbound ramps at Interchange 10, and new roadway improvements to connect River Road and Easton Avenue to the new collector distributor roads. Examples of short term improvements include the reconfiguration of ramps, the widening of Easton Avenue northbound at Davidson Avenue, and the elimination of the left-turn slot on Easton Avenue at World's Fair Drive.

The *Interchange Planning Study* recommended that the physical improvements be accompanied by mobility strategies, to further improve travel conditions in the interchange area. That recommendation led directly to the current study.

2.2 Study Area

As depicted in Figure 2.1, the study area includes most of the northern half of Franklin Township, and virtually all of Piscataway Township. The study area is bounded generally by the old Conrail line, Raritan River, and South Bound Brook border to the north; the Millstone River and Mettler's Road to the west; Amwell Road, JFK Boulevard, Easton Avenue, and Raritan River to the south; and the Piscataway Township and Highland Park borders and Stelton Road, to the east. The study

area was drawn larger than the study area in the Interchange Planning Study since many of the strategies necessitate improvements in a larger geographic area to be effective.

2.3 Public Involvement

The plan development process included a significant public involvement process that solicited stakeholder and public input through a variety of forums. Significant components of the public involvement process included:

Steering Committee. A steering committee was established to provide overall direction for the study. This group consisted of a broad cross-section of township and county officials, township and county personnel, as well as representatives from the New Jersey Department of Transportation (NJDOT), the North Jersey Transportation Planning Authority (NJTPA), NJ TRANSIT, the Delaware & Raritan Canal Commission, Rutgers University, Ridewise of Somerset County, and Keep Middlesex Moving, Inc. The steering committee provided important input relative to shaping the implementation strategies recommended in the plan. Four meetings were held throughout the course of the study.

Focus groups. A series of stakeholder focus groups were conducted with key constituencies. These focus groups were held early in the study process to help the study team to better understand important issues related to each plan element and to provide input on strategies that should receive the greatest attention from the study team. One meeting was held for each of the following five groups:

- State and County Officials
- Transit Providers and TMAs
- Businesses
- Franklin Township Officials
- Piscataway Township Officials

Community Surveys. A series of internet-based surveys of study area residents, workers and employers were conducted. The purpose of the surveys was to help decision makers understand better how local traffic conditions affect residents, workers and employers in the area. Approximately six hundred individuals responded to the survey, providing input related to each of the plan elements.

Technical subcommittees. Four technical subcommittees were convened to review data and analysis results and to discuss potential implementation strategies in detail. Subcommittee membership was drawn from the membership of the steering committee. Meetings were held late in the study, to evaluate and refine initial strategies proposed by the study team to address issues raised in the focus groups. The technical subcommittees were organized according to the following topical areas:

- Pedestrian/ Bicycle
- ITS/ Wayfinding Signage
- Transit/ TDM
- Smart Growth

Two rounds of technical subcommittee meetings were held, for a total of eight meetings.

Public Information Sessions. Two public information sessions were conducted. The first session was held at the beginning of the plan development process to introduce the broader public to the study and to discuss potential mobility plan goals and objectives. The second was held at the end of the study to present the preliminary agenda of implementation strategies recommended in the plan.

Members of the Steering Committee, and participants of the Focus Groups, are listed at the end of this report.

2.4 Goal and Objectives

Following are the goal and objectives of the I-287 Mobility Plan, as agreed upon at the first Steering Committee meeting and first Public meeting:

Goal

Create a package of transportation strategies that will change travel behavior in the study area by reducing the number of vehicular trips and by directing vehicular traffic in a safe and efficient manner.

Objectives

- Assist employers in reducing vehicular trips by identifying feasible travel demand management strategies.
- Identify enhancements to transit services in the study area, particularly those with potential to reduce trips to work.
- Improve pedestrian and bicycle facilities, particularly in proximity to key generators such as large business areas and transit routes.
- Identify needed changes to local master plans and zoning ordinances to encourage transitfriendly developments, the development of pedestrian and bicycle improvements, and mixed-use developments.
- Implement way-finding signage to direct motorists to destinations in an efficient manner using less congested routes.
- Identify Intelligent Transportation System (ITS) strategies with the greatest potential to enhance traffic and incident management operations within the study area.



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\BaseMap_11x17.mxd - 05/25/05

3.0 EXISTING CONDITIONS AND ANALYSIS

3.1 Traffic Conditions

I-287, a limited access expressway, is the most important roadway in the study area. This highway connects Somerset and Middlesex Counties in central New Jersey with the New Jersey Turnpike, Interstate 78, Interstate 80, and the New Jersey coastline via the Garden State Parkway. Within the study area, it carries average daily traffic (ADT) volumes of about 108,000. Within the study area, I-287 has interchanges with Weston Canal Road (Interchange 12), Easton Avenue (Interchange 10), River Road (Interchange 9), Possumtown Road (Interchange 8), South Randolphville Road (Interchange 7), and Washington Avenue (Interchange 6).

Two county roadways in the study area were seen as key to the *Interchange Planning Study*. Easton Avenue (Somerset County Route 527) is a north-south principal arterial roadway that links with I-287 at Interchange 10, and is the most heavily trafficked local roadway in the study area. Traffic volumes are highest just south of Cedar Grove Lane, at 36,650 ADT. River Road (Middlesex County Route 622) is a north-south principal arterial roadway. It has average daily traffic volumes of 24,300 just south of Centennial Avenue.

The ramps connecting I-287 to these two county roadways also carry heavy volumes of traffic. For example, the I-287 southbound off-ramp to Easton Avenue carries 18,900 vehicles per day, while the I-287 southbound off-ramp to River Road carries 10,850 vehicles per day.

Although the vehicular interactions between I-287 and Easton Avenue and River Road are of greatest interest, the Interchange Planning Study also documented regular heavy traffic volumes on local roadways as well. Davidson Avenue, a local roadway in Franklin Township that intersects with Easton Avenue, carries 15,400 vehicles per day. Centennial Avenue, a local roadway in Piscataway Township that intersects with River Road, carries 10,650 vehicles per day.

Because of heavy traffic volumes through the study area, delays are common at key intersections in the AM and PM peak travel periods. A descriptive grading system referred to as the "Level of Service (LOS)" is used to rank both signalized and unsignalized intersections based on the length of vehicular delays commonly experienced. Grades 'A' through 'F' are assigned to signalized intersections, with A representing minimal delays, at 10 seconds or less per average vehicle; and F representing significant delays, at more than 80 seconds per vehicle. (Level of service grades 'E' through 'F' in urban areas are referred to as "failing.")

Levels of Service were assigned to study area intersections as part of the *I-287 Interchange Planning Study*. Based on this grading scale, the major approaches with the heaviest delays in the AM peak period are northbound on River Road at Centennial Avenue, with a Level of Service 'E' for through movements; and northbound on Easton Avenue at Cedar Grove Lane, with an 'E' for through movements. In the evening, northbound Easton Avenue at Davidson Avenue is graded 'F,' and the through movement for northbound River Road at Centennial Avenue is rated 'E.' There are many other failing movements at the intersections of local streets.

An intersection level of service analysis was not performed for I-287, since this highway only has grade-separated interchanges. However, field views indicate regular heavy queuing and congestion in peak travel hours at both Interchanges 10 and 9, for both directions of travel.

Early in the study, major roadway improvements in the region were reviewed to determine whether any would have an impact upon study area roadways. The Route 18, Section 2A project in Piscataway Township was the only project identified. This project has extended Route 18 from its previous termination point at the base of the John Lynch Bridge to Hoes Lane, generally following the vacated Metlar's Road right-of-way. NJDOT has projected that following completion, total traffic volumes on River Road would decrease by about 5% over no-build volumes, and truck volumes would be reduced by the same amount. The impact on River Road will thus not be significant, and does not ameliorate the need to implement physical improvements or mobility enhancements in the I-287 interchange area. Ultimately, however, this project does have the potential to significantly reduce the number of trucks on River Road. When the Route 18 extension project is completed, Piscataway Township can submit a request to ban trucks from River Road. At that point, it would need to be approved by both Middlesex County and NJDOT.

3.2 Journey to Work Analysis

Data from the 2000 US Census Transportation Planning Package was analyzed to determine predominant journey-to-work flows in the study area. Data was analyzed at the census tract level. As indicated in Table 3.1, there are four census tracts in Franklin Township within the study area; together, these host 22,773 workers. Census tracts 535.01, with 11,064 workers, and tract 535.02, with 9,236 workers, have the highest number of employees. The major employment generators in Franklin Township are the office and industrial companies located along Davidson Avenue, World's Fair Drive, Belmont Drive, and Cottontail Lane. Another 10,000 workers are employed in Franklin Township outside the study area tracts, primarily along the Route 27 corridor. A total of 33,011 persons are employed in Franklin Township.

There are seven census tracts in Piscataway Township within the study area; together, these host 40,421 workers. Tract 6.03, with 16,803 workers, and tract 7.02, with 16,185, are home to the highest number of jobs. The major employment generators in Piscataway Township are the office and industrial sites along Centennial Avenue, Hoes Lane, Knightsbridge Road, New England Avenue, Corporate Place, Circle Drive, and New Brunswick Avenue. Other major employers are commercial uses along Centennial Avenue proximate to the intersection with Stelton Road, and along Stelton Road itself. Rutgers University and the University of Medicine and Dentistry – New Jersey, both in central Piscataway, are major employers. Outside the study area, there are only 3,000 jobs within Piscataway Township. In all, 43,481 persons are employed within Piscataway.

		Franklin Township		Piscataway	Township
		Census Tract	Workers	Census Tract	Workers
		531.04	1,375	6.03	16,803
		531.05	1,098	6.05	239
Trooto Incido	Ctudy	535.01	11,064	6.06	2,187
	Sludy	535.02	9,236	6.07	4,599
Aica				6.08	62
				7.01	346
				7.02	16,185
Subtotal:			22,773		40,421
		531.02	863	4.01	561
	Outside Study	531.03	500	4.03	386
Tracts Outside		532	1,252	4.04	717
Area		533	3,886	5.01	553
		534.01	3,031	5.02	843
		534.02	706		
Subtotal:			10,238		3,060
Total Workers:			33,011		43,481

Table 3.1: Total Workers in Franklin and Piscataway Townships

Source: 2000 US Census Transportation Planning Package

To better understand typical journey-to-work flows, the study team sorted the "residence tracts" of all workers that commute to jobs inside census tracts 535.02 and 7.02. Each tract has the second-highest number of jobs within its respective municipality. However, both were chosen for the analysis over the tracts with the highest number of jobs since they encompass the two most critical interchanges in the study area. Tract 535.02 encompasses Interchange 10, and tract 7.02 encompasses Interchange 9.

Figures 3.1 and 3.2 depict all census tracts within a 10 mile radius of the center of the study area. Figure 3.1 categorizes the tracts by the number of residents who live in each tract and who commute to 535.02, and Figure 3.2 categorizes tracts by the number of residents commuting to 7.02. The highest 16 origin tracts are indicated in Tables 3.2 and 3.3.

As indicated, tract 534.01 in southern Franklin Township sends the highest number of workers to tract 535.02, at 150. Other townships represented among the top five origin tracts include Montgomery Township and Hillsborough Township. Some workers in these tracts could be encouraged to bicycle to work if presented with a more comprehensive bicycle network. Transit services could also attract some workers, although it would be difficult to implement regular transit service due south and west of this tract, given the lower population densities. It should be acknowledged that few workers who live in these tracts would drive through the interchange area. However, many of the workers who live in Bridgewater, South Bound Brook, Piscataway, northern Franklin Township, and Edison would likely pass through the interchange area to access jobs in tract 535.02, and would benefit from bicycling and transit strategies. Some workers in tracts 530 (South Bound Brook) and 531.04 (northern Franklin) could actually walk to jobs in the study area.



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\WP_53502_11x17.mxd - 05/25/05



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\WP_702_11x17.mxd - 04/05/05

Given the large number of workers in close proximity to tract 7.02 in Piscataway, there appears to be great potential for increasing the number who choose to commute via transit or bicycle. Some of these commuters could actually walk to work. Workers who live in Franklin Township, and in several of the Piscataway tracts on the north side of I-287, would be most likely to drive through the interchange area. Residents of Highland Park would likely not drive through the interchange area, but would utilize River Road, contributing to congestion proximate to the interchange. Residents of Hillsborough Township and Bridgewater Township are likely to drive through the interchange area to access jobs in tract 7.02, but it would be difficult to serve them through bicycling or transit modes.

Franklin Township				
Rank	Residence Tract	Town	Number of Workers	
1	534.01	Franklin	150	
2	539.02	Montgomery	145	
3	537.01	Hillsborough	140	
4	538.03	Hillsborough	125	
5	531.05	Franklin	110	
6	507	Bridgewater	100	
7	531.03	Franklin	90	
8	606	Piscataway	85	
8	530	South Bound Brook	85	
8	531.02	Franklin	85	
8	531.04	Frankin	85	
9	15.04	Edison	80	
10	85.01	South Brunswick	75	
10	85.03	South Brunswick	75	
10	510	Bridgewater	75	
10	538.04	Hillsborough	75	
Total:			1,580	

Table 3.2: Top Origin Tracts for Tract 535.02

Piscataway Township				
Rank	Residence Tract	Town	Number of Workers	
1	7.02	Piscataway	390	
2	5.02	Piscataway	305	
3	534.01	Franklin	295	
4	11	Highland Park	290	
5	4.04	Piscataway	210	
6	6.07	Piscataway	185	
7	531.04	Franklin	175	
8	6.06	Piscataway	165	
9	7.01	Piscataway	160	
10	538.03	Hillsborough	155	
11	531.05	Franklin	150	
12	537.01	Hillsborough	150	
13	15.04	Edison	145	
14	507	Bridgewater	135	
15	62.05	North Brunswick	120	
16	<u>50</u> 1	Piscataway	<u>1</u> 15	
Total:		-	3,145	

Table 3.3: Top Origin Tracts for Tract 7.02

A journey-to-work analysis of tracts 535.01 and 6.03 reveal similar residential patterns among workers. However, unlike 535.02, Middlesex Borough and South Bound Brook Borough appear among the top five origin tracts for tract 535.01. Persons living in these tracts would be candidates for transit and bicycling strategies and, in the case of South Bound Brook, possibly walking to work. Like tract 7.02, tract 6.03 in Piscataway draws a large pool of workers from other tracts in Piscataway; indeed, every surrounding tract in Piscataway Township contributes at least 100 workers to tract 6.03. Origin tracts in Edison Township and Franklin Township are also well represented. These would all be candidates for bicycling and transit strategies, and some employees could possibly walk to work.

Franklin Township				
Rank	Residence Tract	Town	Number of Workers	
1	534.01	Franklin	235	
2	507	Bridgewater	180	
3	2	Middlesex	140	
4	531.05	Franklin	125	
5	536.02	Branchburg	115	
6	515	Manville	105	
	530	South Bound Brook	105	
	537.01	Hillsborough	105	
7	84.03	South Brunswick	100	
	510	Bridgewater	100	
8	537.05	Hillsborough	95	
9	3	Dunellen	90	
	5.02	Piscataway	90	
10	1	Middlesex	80	
	63	Milltown	80	
	392	Plainfield	80	
	511	Bound Brook	80	
	514	Manville	80	
	535.01	Franklin	80	
	539.03	Montgomery	80	
Total:			2,145	

Table 3.4: Top Origin Tracts for Tract 535.01

Table 3.5: Top Origin Tracts for Tract 6.03

Piscataway Township					
	Residence Number of				
Rank	Tract	Town	Workers		
1	5.02	Piscataway	340		
2	4.04	Piscataway	315		
3	7.02	Piscataway	245		
4	4.01	Piscataway	200		
5	6.03	Piscataway	195		
6	5.01	Piscataway	175		
7	4.03	Piscataway	165		
	6.06	Piscataway	165		
8	534.01	Franklin	160		
9	3	Dunellen	145		
10	62.05	North Brunswick	140		
	507	Bridgewater	140		
11	7.01	Piscataway	135		
12	10.02	South Plainfield	130		
13	6.07	Piscataway	125		
14	15.04	Edison	120		
	531.05	Franklin	120		
Total:			3,015		

An analysis of journey-to-work data also illustrates both the limitations and potential of the strategies considered within this report. The originating census tracts of the workers commuting to the study area are very diffuse. For example, across New Jersey, there are 191 tracts that send at least 25 workers to tract 7.02. Because of distance or lack of significant options, driving is the easiest option for many of these workers. On the other hand, given the large number of tracts with at least 25 residents traveling to work in the study area, carpooling and vanpooling strategies may be feasible.

An analysis of journey-to-work data also indicates why travel demand management strategies should focus on managing the trip to work, rather than the trip from home. Table 3.6 indicates the number of residents in each tract within the study area who are employed. Close to 26,000 residents in Franklin Township are employed; only 7,613 persons, or one-third of the employed residents in Franklin, live within the study area. Close to 25,000 residents in Piscataway Township are employed, with slightly more than half living within the study area.

	Franklir	Franklin Township		vay Township
	Census Tract	Residents	Census Tract	Residents
	531.04	2,661	6.03	1,310
	531.05	3,719	6.05	637
Tracta Incida Ct	535.01	840	6.06	3,685
	535.02	393	6.07	1,798
Alca			6.08	856
			7.01	1,886
			7.02	2,839
Subtotal:		7,613		13,011
	531.02	1,952	4.01	1,859
	531.03	2,458	4.03	1,689
Tracts Outside St	udy 532	3,199	4.04	2,726
Area	533	1,590	5.01	2,257
	534.01	6,744	5.02	3,359
	534.02	2,372		
Subtotal:		18,315		11,890
Total Employed Re	sidents:	25,928		24,901

Table 3.6: Total Employed Residents in Franklin and Piscataway 7	Township	JS
--	----------	----

Source: 2000 US Census Transportation Planning Package

3.3 Community Surveys

A series of three internet-based community surveys were conducted to solicit public and stakeholder input regarding the nature of traffic problems in the I-287 interchanges area; the extent to which TDM programs and transit are currently used by area residents and workers; and to gauge public support for a variety of potential mobility enhancement strategies under consideration as part of the I-287 Mobility Plan Study. Surveys were administered to three groups: residents, workers and employers. Approximately six hundred individuals responded to the survey, providing input related to each of the plan elements.

3.3.1 Resident Survey

A survey of residents living in Piscataway and Franklin Townships was designed and administered. The purpose of the survey was to: understand better the travel needs of area residents; solicit input on what types of mobility enhancement strategies they would favor; ask participants to identify the location of missing pedestrian and sidewalk facilities and connections; and solicit input on preferred land use strategies and policies. Residents were recruited to participate in the survey through media articles, flyers posted in area retail establishments and community facilities, and through word-of-mouth. Those participating in the survey were entered to win one of four fifty dollar gift certificates to area restaurants. Three hundred eighty four residents participated in the survey, which was administered via a public access Internet website. The following is a summary of survey results:

General Findings

As previously stated, 384 residents participated in the survey. Twenty six percent of the residents surveyed worked in either Franklin (14%) or Piscataway Township (12%). The remaining 74 percent worked outside the study area. The vast majority of residents surveyed (78%) reported driving alone to work every workday. Most survey participants (61%) reported traveling "through or near the Easton Avenue and/or River Road interchanges with I-287" everyday or almost everyday. Another 22 percent traveled through the area "at least a couple of times a week."

As shown in table 3.7, the overwhelming majority (86%) of survey participants reported traffic conditions in the interchanges area to be a "big problem." Another 13 percent reported traffic conditions to be somewhat of a problem. This pattern held true when asked about traffic during commute hours and on weekdays; however, traffic was seen as far less of a problem during lunchtime and on weekends. The vast majority reported traffic during the morning (87%) and evening (92%) commute to be a "big problem." Less than half of the survey respondents (37%) reported traffic at lunchtime to be a "big problem" and even fewer (18%) felt traffic on weekends was a problem.

	Somewhat a <u>Big problem</u> <u>Problem</u>			Not a Problem		
	No.	Percent	No.	Percent	No.	Percent
Overall impression of traffic conditions in the						
interchange area	279	86%	43	13%	4	1%
Traffic in the morning b/w 7:30 and 9:30 AM	289	87%	36	11%	9	3%
Traffic during lunchtime b/w 12:00 and 2:00 PM	123	37%	143	43%	68	20%
Traffic in the evening b/w 4:30 and 6:30 PM	307	92%	23	7%	4	1%
Weekdays	273	82%	54	16%	7	2%
Weekends	59	18%	128	38%	147	44%

Table 3.7: Resident Opinions of Traffic Conditions in the Interchange Area

Transit Findings

In addition to polling residents regarding general travel experiences and impressions of traffic in the interchanges area, residents were asked a series of questions related to their awareness and use of transit. Less than half (46%) were aware of the existing transit services operating in the study area. Only 6 percent reported ever having used the services. Not surprisingly, most (79%) expressed the opinion that existing services were inadequate to meet their travel needs. Table 3.8 indicates what aspects of existing transit services residents described as inadequate and their opinions related to how transit services could be improved.

		No.	Percent
In what ways are existi	ng transit services inadequate?		
a) Routes do not	serve the places I need to go	76	27%
b) Stops are loca	ted too far from my residence	50	18%
c) Stops are loca	ted too far from my work location	34	12%
d) Stops are loca	ted too far from my non-work destinations	35	13%
e) Service is not f	requent enough	38	14%
f) Service in the	morning does not start early enough for my travel needs	8	3%
g) Service in the	evening does not run late enough for my travel needs	19	7%
h) Other (please	specify)	17	6%
What ways should be c	onsidered to improve transit service?		
a) Add more trans	sit routes	200	33%
b) Provide more f	requent service on existing routes	128	21%
c) Extend the hou	irs of service	114	19%
d) Provide fare-fr	ee rides	70	12%
e) Allow passeng	ers to bring bicycles on board	42	7%
f) Other (please s	specify)	45	8%

Table 3.8: Resident Opinions Related to Transit

When asked an open-ended question regarding how to improve transit services, residents offered a variety of suggestions. The following are a sampling of the more specific and frequently cited responses:

- Provide service in the Amwell Road/South Middlebush Road corridor;
- Do a better job of promoting and advertising services to area residents, employers and businesses;
- Provide more service along Demott Lane and Cedar Grove Lane;
- Provide more service to area malls and shopping centers, including Hadley Mall, Middlesex Mall and the Wal-Mart shopping center in Piscataway Township;
- Add more service connecting to train stations;
- Serve more of the corporate parks in Franklin Township;
- Provide better service to Quailbrook area of Franklin Township;
- Provide more evening runs that correspond with train schedules;
- Make transit routes overlap and provide interconnections between routes; and
- Provide service to/from the municipal complex and New Brunswick train station.

Pedestrian/Bicycle Findings

Residents were also asked to express their opinions related to walking and biking in their community. One hundred ninety eight survey participants (65%) reported that their neighborhood had sidewalks. As shown in Table 3.9, when asked to "think about the neighborhood in which they live," most residents expressed strong agreement that sidewalks in their neighborhood were adequate (64%) and maintained in good condition (58%). Slightly less than half (49%) strongly agreed that crosswalks were well defined and maintained in their neighborhood. Less than a third (30%) felt that sidewalks and crosswalks were well lit at night. Sixty-nine percent of survey respondents reported feeling safe walking in their neighborhood and 52 percent reported feeling safe walking to and from community destinations within ½ mile of their neighborhood. Finally, 76 percent of the residents surveyed indicated that they would "walk more" if they had a "safe and comfortable walking environment."

	<u>Stroi</u> No.	ngly Agree Percent	<u>Somev</u> No.	vhat Agree Percent	<u>Strong</u> No.	l <u>y Disagree</u> Percent
Existing sidewalks in my neighborhood are adequate	124	64%	55	28%	15	8%
Sidewalks are maintained in good condition	112	58%	62	32%	20	10%
Crosswalks are well defined and maintained	96	49%	68	35%	30	15%
Sidewalks and crosswalks are well lit at night	60	31%	94	48%	40	21%
Sidewalks connect to community destinations w/in 1/2						
mile of my neighborhood	58	30%	61	31%	45	23%
I feel safe walking in my neighborhood	133	69%	43	22%	18	9%
I feel safe walking to and from community destinations w/in 1/2 mile of my neighborhood	101	52%	61	31%	32	16%

Table 3.9: Resident Opinions Related to Walking and Sidewalk Conditions

Only one third (33%) of residents expressed the opinion that local roads were safe for bicycling. At the same time, 84 percent felt that dedicated bicycle facilities such as bike lanes or paths would make bicycling safer in their community. When asked if they would bicycle more if their community

had a network of bicycle routes, lanes and paths, many residents responded affirmatively (see Table 3.10).

Trip Purpose	No.	Percent
To go to work	47	9%
To go shopping	82	15%
Recreation	223	41%
To visit friends	120	22%
I would not consider bicycling more	57	10%

 Table 3.10: Purposes For Which Residents Would Consider Bicycling

In addition to soliciting opinions related to walking and biking, residents were asked an open-ended question regarding where specifically they would like to see pedestrian and bicycle improvements made. As shown in Table 3.11, a number of roadways appear to be clear priorities among residents. In Franklin Township, Easton Avenue, Cedar Grove Lane, Demott Avenue, Amwell Road, Davidson Avenue and Pierce Street are top choices for sidewalk or bike facility installation. In Piscataway, River Road, Centennial Avenue, Metlars Lane and Hoes Lane rank high.

Facility Type	Township	Roadway	Number of Responses
Sidewalks	Franklin Township	Cedar Grove Lane	5
		Demott Lane	4
		Easton Avenue	4
		Amwell Road	3
		New Brunswick Road	3
	Piscataway Township	No location more than once	
Bicycle facilities	Franklin Township	Easton Avenue	8
2		New Brunswick Road	4
		Demott Lane	3
	Piscataway Township	River Road	6
Type of facility not specified	Franklin Township	Easton Avenue	32
		Amwell Road	26
		Cedar Grove Lane	26
		Demott Lane	13
		Elizabeth Avenue	10
		New Brunswick Road	9
		JFK Boulevard	6
	Piscataway Township	River Road	11
		Metlars Lane	6
		Centennial Avenue	4
		Hoes Lane	4
	On Township border	Raritan River crossing	4

Table 3.11: Resident Opinions Related to Locations Where Sidewalks and/or Bike Facilities are Needed

Smart Growth Land Use Findings

The final area of inquiry in the resident survey related to potential changes in land use policies that could help make developed areas more transportation-efficient. Residents were asked to provide their opinions relative to a number of smart growth land use strategies. Table 3.12 provides a summary of survey results. It is evident from the responses that there is significant public support for almost all of the suggested strategies. Of particular note is the number of residents that expressed support or strong support for locating new buildings close to the street with parking in the rear (78%); making sure building fronts are oriented to the street (91%); encouraging mixed-use development (77%), retrofitting existing developed areas with a mix of land uses (81%), as well as the overwhelming support expressed for strategies designed to improve conditions for pedestrians and transit users.

Sm	art Growth Strategy	Strong Support	Support	Do Not Support
1.	Cluster new buildings close together to make it easier	36%	36%	28%
	to walk between buildings			
2.	Locate new buildings close to the street with parking behind the building	34%	44%	23%
3.	Make sure building fronts are oriented to the street with doors and windows designed to enhance pedestrian experience	45%	46%	9%
4.	Encourage the use of pedestrian-scaled lighting and the installation of pedestrian amenities such as benches where appropriate	71%	24%	5%
5.	Increase the density of new development to make transit service more viable	31%	32%	37%
6.	Encourage mixed-use development that includes residential, retail and offices near one another	37%	40%	23%
7.	Retrofit existing developed areas with a mix of uses. For example, permitting new residential development in retail/office districts or retail development in office districts	41%	40%	19%
8.	Include "traffic calming" elements such as intersection neck downs, bulb outs, and textured crosswalks in street design to slow traffic down	55%	25%	20%
9.	Require sidewalks and bike paths as part of new development	82%	14%	4%
10.	Install sidewalks and bike paths in already developed areas where they are missing	74%	19%	8%
11.	Include bus pull offs and shelters as part of new development	64%	29%	8%
12.	Adjust parking standards to reduce the amount of parking constructed as part of new development	27%	45%	28%
13.	Require property owners and developers to develop trip reduction plans to limit the number of cars entering and exiting their sites during peak commuting hours	28%	34%	41%

Table 3.12: Resident Support for Various Smart Growth Strategies

3.3.2 Worker Survey

In addition to the resident survey, a survey of employees working within the study area was designed and administered. The purpose of the worker survey was to: understand better employee travel choices, document the extent to which individuals employed in the study area are currently using commute options to travel to and from work, and gauge interest in various TDM strategies and support programs. Workers were recruited to participate in the survey through media articles, flyers posted in area retail establishments and through word-of-mouth. Those

participating in the survey were entered to win one of four fifty dollar gift certificates to area restaurants. One hundred eighty-two workers participated in the survey, which was administered via a public access Internet website. The following is a summary of survey results:

General Findings

As stated above, 182 workers participated in the survey. Most (70%) reported traveling "through or near the Easton Avenue and/or River Road interchanges with I-287" everyday or almost everyday. Another 11 percent traveled through the area "at least a couple of times a week." More than half (55%) reported that traffic in the interchanges area caused them to "take an alternate route to or from home, work, or other non-work destinations" at least one time per week. Not surprisingly, almost two-thirds (65%) reported "complaining to members of their family, friends or co-workers about traffic in the interchanges area" at least one time per week.

Worker opinions of traffic were very similar to those expressed by residents. As shown in table 3.13, the overwhelming majority (85%) of survey participants reported traffic conditions in the interchanges area to be a "big problem." Another 13 percent reported traffic conditions to be somewhat of a problem. This pattern held true when asked about traffic during commute hours and on weekdays; however, workers considered traffic much less of a problem during lunchtime and on weekends. The vast majority reported traffic during the morning (84%) and evening (89%) commute to be a "big problem." Only a small number of respondents (13%) reported traffic at lunchtime to be a "big problem" and even fewer (10%) felt traffic on weekends was a problem.

	Somewhat a <u>Big problem</u> <u>Problem</u>			Not a Problem		
	No.	Percent	No.	Percent	No.	Percent
Overall impression of traffic conditions in the						
interchange area	128	85%	19	13%	1	1%
Traffic in the morning b/w 7:30 and 9:30 AM	129	84%	21	14%	3	2%
Traffic during Lunchtime b/w 12:00 and 2:00 PM	20	13%	78	51%	55	36%
Traffic in the evening b/w 4:30 and 6:30 PM	136	89%	14	9%	3	2%
Weekdays	130	85%	18	12%	5	3%
Weekends	16	10%	45	29%	92	60%

Table 3.13: Worker Opinions of Traffic Conditions in the Interchange Area

Travel Demand Management Findings

The overwhelming majority of workers surveyed (96%) reported "usually" driving alone to work. When asked why they drove alone, workers cited the following reasons, presented in rank order:

- 1. I need my car for personal or company business.
- 2. I prefer to drive my own car.
- 3. There is not transit near my home or work.
- 4. My schedule is irregular.
- 5. Driving alone takes the least amount of time.

When asked if they would consider commuting to work using an alternative mode, nearly half (48%) said "yes." A follow-up question asked those workers who responded that they would consider using an alternate mode to travel to and from work, which alternatives they would consider. Table 3.14 shows their responses.

Table 3.14: Mode Options Workers are Willing to Consider				
Alternative to driving alone	No.	Percent		
Car/van-pool as a driver	21	36%		
Car/van-pool as a passenger	34	58%		
Public transit or shuttle bus	45	76%		
Walking	2	3%		
Bicycling	5	8%		

Workers were also asked a series of questions related to which, if any, TDM strategies and support programs were offered by their employer to encourage the use of commute options. Table 3.15 indicates which strategies and programs are currently offered by area employers (based on the respondents' knowledge). In general, the vast majority of workers surveyed were unaware of whether or not their employer offered or supported TDM strategies and support programs and very few responded affirmatively that strategies were currently being offered by area employers. When asked to rank the TDM strategies and support programs, workers expressed no clear preferences among the strategies and programs listed.

Strategy or Support Program	Curren	tly Offered	Don't Know		
	No.	Percent	No.	Percent	
TDM Strategies					
Flextime	47	40%	57	48%	
Alternative or compressed work week	20	17%	85	73%	
Telecommuting	34	29%	75	64%	
Commute alternative subsidies	7	6%	104	91%	
Employer-subsidized vanpool	2	2%	104	91%	
Employee-directed vanpool	6	5%	96	86%	
Preferrential car/van-pool parking	6	5%	100	88%	
Parking "cash-out"	0	0%	112	99%	
Parking fees for employees	4	4%	108	96%	
Reduced/limited parking at employment site	0	0%	111	99%	
Support Programs					
Emergency ride home	3	3%	100	92%	
Ride-matching	3	3%	101	90%	
On-site transportation coordinator	2	2%	101	93%	
On-site services	13	12%	93	84%	
Concierge services	2	2%	105	96%	
Amenities for employees that walk or bike to work	13	12%	95	86%	
Station cars	6	6%	101	93%	
Employer-sponsored shuttle services	7	6%	99	91%	
Information and promotional materials relate to TDM	5	5%	98	88%	

Table 3.15: TDM Strategies and Programs Currently Offered by Study Area Employers

Transit Findings

In addition to polling workers regarding their perceptions of traffic in the interchanges area and awareness of TDM strategies and programs, workers were asked a series of questions related to their awareness and use of transit. Only about one-third of the workers surveyed (36%) were aware of the existing transit services operating in the study area. None of the workers reported ever having used the services. Not surprisingly, most (91%) expressed the opinion that existing services were inadequate to meet their travel needs. Table 3.17 indicates what aspects of existing transit services workers described as inadequate and their opinions related to how transit services could be improved.

		No.	Percent			
In what w	n what ways are existing transit services inadequate?					
a) F	Routes do not serve the places I need to go	21	28%			
b) S	Stops are located too far from my residence	16	21%			
c) S	Stops are located too far from my work location	10	13%			
d) S	Stops are located too far from my non-work destinations	4	5%			
e) S	Service is not frequent enough	6	8%			
f) S	Service in the morning does not start early enough for my travel needs	6	8%			
g) S	Service in the evening does not run late enough for my travel needs	4	5%			
h) (Other (please specify)	8	11%			
What way	ys should be considered to improve transit service?					
a) A	Add more transit routes	82	36%			
b) F	Provide more frequent service on existing routes	52	23%			
c) E	Extend the hours of service	36	16%			
d) F	Provide fare-free rides	37	16%			
e) A	Allow passengers to bring bicycles on board	10	4%			
f) (Other (please specify)	13	6%			

Table 3.17: Worker Opinions Related to Transit

When asked an open-ended question regarding how to improve transit services, workers offered a variety of suggestions. The following are a sampling of the more specific and frequently cited responses:

- Do a better job of promoting and advertising services to area residents, employers and businesses:
- Provide more service to Hoes Lane and Centennial Avenue;
- Extend hours of operation in the morning and evening;
- Provide service between Franklin Township and Piscataway Township;
- Provide service from Bridgewater/Somerville to New Brunswick train station; and
- Add more service connecting to train stations.

Pedestrian/Bicycle Findings

Workers were asked to express their opinions related to walking and biking near where they work. Only 31 workers reported that there were sidewalks near their work location. As shown in Table 3.18, when asked to "think about the area around your work location," workers expressed mixed opinions. Most strongly agreed that sidewalks near where they worked were adequate (65%) and that crosswalks were well defined and maintained in good condition (61%). A smaller majority strongly agreed that the sidewalks themselves were maintained in good condition (55%). Thirty-nine percent reported that sidewalks connected to community destinations within ½ mile. Forty-two percent of workers reported feeling safe walking near their work location; however, only 32 percent reported feeling safe walking to and from community destinations within ½ mile of their work location.

	Strongly Agree		Somewhat Agree		Strongly Disagree	
	No.	Percent	No.	Percent	No.	Percent
Existing sidewalks near my work location are adequate	20	65%	8	26%	3	10%
Sidewalks are maintained in good condition	17	55%	12	39%	2	6%
Crosswalks are well defined and maintained	19	61%	10	32%	2	6%
Sidewalks and crosswalks are well lit at night	13	42%	17	55%	1	3%
Sidewalks connect to community destinations w/in 1/2						
mile of my work location	12	39%	14	45%	5	16%
I feel safe walking in near my work location	13	42%	15	48%	3	10%
I feel safe walking to and from community destinations w/in 1/2 mile of my work location	10	32%	16	52%	5	16%

Table 3.18: Worker Opinions Related to Walking and Sidewalk Conditions

Less than one third (27%) of workers surveyed expressed the opinion that local roads were safe for bicycling. At the same time, 83 percent felt that dedicated bicycle facilities such as bike lanes or paths would make bicycling safer in the community where they work. When asked if they would bicycle more if the community had a network of bicycle routes, lanes and paths, more than half (57%) responded affirmatively.

In addition to soliciting opinions related to walking and biking, workers were asked an open-ended question regarding where specifically they would like to see pedestrian and bicycle improvements made. As shown in Table 3.19, a number of roadways appear to be clear priorities among workers. In Franklin Township, Davidson Avenue and Pierce Street are top choices for sidewalk or bike facility installation. In Piscataway, Centennial Avenue and River Road rank high.
Following are the top choices in the worker surveys for roadways to host sidewalk or bicycle facilities:

 Table 3.19: Worker Opinions Related to Locations Where Sidewalks and/ or Bike Facilities are Needed

 Facility Type
 Township
 Pacdway
 Number of

Facility Type	Township	Roadway	Number of Responses
Type of facility not specified	Franklin Township	Davidson Avenue	5
		Pierce Street	3
		Easton Avenue	2
		Weston Canal Road	2
	Piscataway Township	Centennial Avenue	7
		River Road	6
		Hoes Lane	2

Smart Growth Land Use Findings

Similar to the resident survey, the final area of inquiry in the worker survey related to potential changes in land use policies that could help make developed areas more transportation-efficient. Workers were asked to provide their opinions relative to a number of smart growth land use strategies. Table 3.20 provides a summary of survey results. It is evident from the responses that there is significant public support for almost all of the suggested strategies.

Sm	art Growth Strategy	Strong Support	Support	Do Not Support
1.	Cluster new buildings close together to make it easier to walk between buildings	41%	36%	22%
2.	Locate new buildings close to the street with parking behind the building	46%	36%	18%
3.	Make sure building fronts are oriented to the street with doors and windows designed to enhance pedestrian experience	52%	32%	16%
4.	Encourage the use of pedestrian-scaled lighting and the installation of pedestrian amenities such as benches where appropriate	67%	21%	12%
5.	Increase the density of new development to make transit service more viable	48%	28%	24%
6.	Encourage mixed-use development that includes residential, retail and offices near one another	40%	39%	21%
7.	Retrofit existing developed areas with a mix of uses. For example, permitting new residential development in retail/office districts or retail development in office districts	45%	41%	8%
8.	Include "traffic calming" elements such as intersection neck downs, bulb outs, and textured crosswalks in street design to slow traffic down	48%	27%	25%
9.	Require sidewalks and bike paths as part of new development	66%	22%	13%
10.	Install sidewalks and bike paths in already developed areas where they are missing	68%	20%	12%
11.	Include bus pull offs and shelters as part of new development	62%	24%	14%
12.	Adjust parking standards to reduce the amount of parking constructed as part of new development	28%	41%	31%
13.	Require property owners and developers to develop trip reduction plans to limit the number of cars entering and exiting their sites during peak commuting hours	32%	35%	33%

Table 3.20: Worker Support for Various Smart Growth Strategies

3.3.3 Employer Survey

A survey of employers located within the study area was designed and administered. The purpose of the survey was to understand better the nature of existing travel demand management programs offered by area employers and to gauge the willingness of employers to cooperate in implementing new or expanded TDM programs in the future. Employers were recruited via direct mail, follow-up telephone calls, outreach to local and regional chambers of commerce and business associations, media articles, flyers posted in area retail establishments and through word-of-mouth. Those participating in the survey were entered to win one of four fifty dollar gift certificates to area restaurants. The survey was administered via a public access Internet website. Those accessing the employer survey were asked a "screener" question to determine if they had authority to make or participated in making decisions related to employee benefit programs. The survey session for those responding negatively was terminated.

Despite significant outreach efforts, only sixteen employers participated in the survey. Four were not involved in benefit decisions. Their survey session was terminated. Four reported having final decision-making authority related to employee benefits and another eight reported participating in decisions related to employee benefit programs. Ten individuals completed the entire employer survey. Following is a summary of survey results.

General Findings

All but two of the employers completing the survey expressed the opinion that traffic conditions in the interchanges area was a "big problem." This pattern held true when asked about traffic during commute hours and on weekdays. As was the case among residents and workers, employers considered traffic much less of a problem during lunchtime and on weekends. All agreed that traffic during the morning and evening commute was a "big problem" (see Table 3.21). Eight of the ten employers reported "hearing complaints from employees about traffic at or near the interchanges area at least a couple of times per week."

	<u>Big p</u>	problem	Som <u>Pr</u>	ewhat a oblem	<u>Not a</u>	<u>Problem</u>
	No.	Percent	No.	Percent	No.	Percent
Overall impression of traffic conditions in the						
interchange area	8	80%	2	20%	0	0%
Traffic in the morning b/w 7:30 and 9:30 AM	10	100%	0	0%	0	0%
Traffic during Lunchtime b/w 12:00 and 2:00 PM	4	40%	1	10%	5	50%
Traffic in the evening b/w 4:30 and 6:30 PM	10	100%	0	0%	0	0%
Weekdays	9	90%	1	10%	0	0%
Weekends	5	50%	0	0%	5	50%

Table 3.21: Employer Opinions of Traffic Conditions in the Interchange Area

Travel Demand Management Findings

Employers were asked a series of questions related to which, if any, TDM strategies and support programs their company currently offers or might be willing to offer to encourage the use of commute options. Table 3.22 indicates which strategies and programs are currently offered by area employers and which they might be interested in for the future. Interestingly, many of the individuals surveyed reported being unaware whether their company offered TDM

strategies/support programs and/or ambivalent as to whether they would be willing to consider such programs in the future. When asked to rank TDM strategies in order of preference, employers were most interested in: flextime, alternative/compressed workweeks, telecommuting and preferential car/van-pool parking. When asked to rank support programs, employers preferred: emergency ride home, concierge services, amenities for employees that walk or bike to work, ride-matching services, and on-site services such as daycare and cafeterias. When asked "how interested is your company in promoting the use of commute options," three employers expressed strong interest, three expressed some interest and two were not at all interested.

	Currently Offer		ls Willir <u>in the</u>	ng to Offer e Future	Don't Know / Not Sure	
	No.	Percent	No.	Percent	No.	Percent
TDM Strategies						
Flextime	4	44%	0	0%	5	56%
Alternative or compressed work week	0	0%	1	13%	7	88%
Telecommuting	0	0%	1	13%	5	63%
Commute alternative subsidies	1	13%	2	25%	5	63%
Employer-subsidized vanpool	1	13%	0	0%	8	100%
Employee-directed vanpool	0	0%	1	11%	7	78%
Preferrential car/van-pool parking	1	11%	1	11%	7	78%
Parking "cash-out"	0	0%	0	0%	8	100%
Parking fees for employees	0	0%	0	0%	8	100%
Reduced/limited parking at work site	0	0%	0	0%	8	100%
Support Programs						
Emergency ride home	3	38%	2	25%	3	38%
Ride-matching	0	0%	2	29%	5	71%
On-site transportation coordinator	1	13%	1	13%	6	75%
On-site services	2	25%	0	0%	6	75%
Concierge services	1	14%	0	0%	6	86%
Amenities for employees that walk or bike to work	1	13%	1	13%	6	75%
Station cars	0	0%	1	14%	6	86%
Employer-sponsored shuttle services	2	25%	0	0%	6	75%
Information and promotional materials related to TDM	1	13%	2	25%	5	63%

Employers were also asked for their opinions related to the impediments and/or obstacles to promoting the use of commute options. Four indicated that their company does not have the funding needed to create, sustain, or expand the use of commute option strategies or support programs. Another four reported either not having a thorough understanding of commute option strategies or being unsure how to begin implementing commute option strategies and support programs. According to employers, the most important benefits from implementing commute option programs were the following:

- Creates a positive, progressive corporate image;
- Provides advantages in employee recruitment and retention;
- Improves employee morale and productivity;

- Reduces employee absenteeism; and
- Reduces employee commute costs.

Transit Findings

In addition to polling employers regarding their perceptions of traffic in the interchanges area and involvement with TDM strategies and programs, employers were asked a series of questions related to their awareness and use of existing transit services. Six of the eight employers responding to the questions related to transit reported being aware of the existing transit services operating in the study area. Only one expressed the opinion that existing services were adequate to meet the needs of at least some of their employees. Table 3.23 indicates what aspects of existing transit services employers' described as inadequate and their opinions related to how transit services could be improved.

able 3.	23: Employer Opinions Related to Transit		
		No.	Percent
In what	ways are existing transit services inadequate?		
i)	Routes do not stop close enough to my company	2	40%
j)	Service is not frequent enough	0	0%
k)	Service in the morning does not start early enough	1	20%
I)	Service in the evening does not run late enough	1	20%
m)	Other (please specify)	1	20%
What w	vays should be considered to improve transit service?:		
g)	Add more transit routes	3	20%
h)	Provide more frequent service on existing routes	3	20%
i)	Extend the hours of service	3	20%
i)	Provide fare-free rides	2	13%

Ta

Wayfinder Signage Findings

Other (please specify)

k)

1)

The final area of inquiry on the employer survey related to "wayfinder" signs. The five employers completing this section of the survey expressed mixed opinions related to what kinds of signing strategies should be used in the study area. Although there was no clear consensus expressed for any one specific strategy, there was some support expressed for each of the following:

- Color-coding signs (e.g., one color for Franklin Township destinations and a different color for Piscataway Township destinations);
- Signs that use icons or graphical representations of area sites and destinations (e.g., a town hall icon for the municipal complex);
- Signs that direct motorists to specific destinations (e.g., the Marriott or Starbucks Coffee); and
- Signs that tell the distance to a specific destination.

Allow passengers to bring bicycles on board

7%

20%

1

3

4.0 TRAVEL DEMAND MANAGEMENT

4.1 Introduction

Travel Demand Management (TDM) is a demand based approach to traffic congestion that utilizes incentives, products and services to affect individual travel choices. The often cited benefits of implementing TDM strategies and programs include:

- Expands business hours without increasing costs (e.g., by allowing some employees to work earlier or later than traditional business hours);
- Improves general business operations;
- Creates positive, progressive corporate image;
- Provides advantages in employee recruitment and retention;
- Improves employee morale and productivity;
- Reduces employee absenteeism; and
- Reduces employee commute costs.

The New Jersey Statewide Long-Range Transportation Plan Update, *Transportation Choices 2025*, published in March 2001, identifies TDM as a policy that should continue to be implemented. The plan stresses that the state's Transportation Management Associations (TMAs) are critical facilitators of travel demand management programs. There are two TMAs which promote the use of commute alternatives and provide TDM-related employer services in the study area. They are *Keep Middlesex Moving, Inc.* of Middlesex County and *RideWise of Raritan Valley* serving Somerset County.

4.2 Typical TDM Strategies and Programs

The following sections describe a range of TDM program strategies that specifically focus on peak hour commutes into the study area. The study team has observed that several of these strategies have already been introduced into the study area in one manner or another. These strategies and programs, which focus on the work commute, help to reduce the number of single-occupant vehicles traveling during peak hours.

4.2.1 Alternatives to Driving Alone

These strategies are alternative ways to travel that do not require driving alone.

• **Transit** – Limited local and regional bus/shuttle service is available within the study area. Routes include:

<u>NJ TRANSIT 980 (Wheels)</u> – This shuttle bus serves destinations in Piscataway Township on Centennial Avenue, Knightsbridge Road, Hoes Lane and River Road. Service originates at the New Brunswick train station and includes 3 trips in the morning and 2 trips in the evening. Fares are \$1.10 each way.

<u>Davidson Avenue Shuttle (DASH)</u> – This shuttle bus has two routes. SC1 provides service between parts of Bridgewater Township and Bound Brook train station to destinations in Franklin Township along Davidson Avenue. SC2 provides service between the New Brunswick train station and destinations along Easton Avenue, JFK Boulevard, New Brunswick

Road, and Davidson Avenue. These shuttles run once per hour between 6:30 – 8:30 am and 3:00-5:30 pm. Fares are \$1.00 each way. Suburban Transit/Coach USA commuter bus service to NYPA via Easton Avenue.

There are also a number of regional transportation services that serve the larger region, including NJ TRANSIT regional rail service on the Raritan Valley line and the Northeast Corridor rail line.

Ridesharing (Carpool/Vanpool) – Individuals living or working in close proximity to each other can be organized into a carpool or vanpool. TMAs and some employers offer an institutional structure to manage and support a comprehensive approach to ridesharing. Through the use of 'ridematching' services, TMAs systematically coordinate the matching of large volumes of potential riders into new ridesharing groups or into existing groups. Generally, carpools are recommended for commuter groups with five or fewer members that travel for a short duration such as 10-15 miles. Vanpools on the other hand are typically recommended for commuter groups who have a commute greater than 15 miles.

There are a variety of vanpool arrangements. In some cases, employers sponsor the vanpool for their employees by contracting with a third party provider. Other employers provide their own vehicles. More frequently however, vanpools are formed by groups of employees which contract with a business in the private sector to provide the vehicle and its maintenance. The vanpool group selects, from among itself, the individual(s) who serve as the driver(s). A vanpool subsidy program is provided by NJ TRANSIT with a usual subsidy of \$150/month to qualified vanpools. Generally, vanpools are most cost effective when the one way commute distance is at least 20 miles.

Both carpools and vanpools can have a significant impact on traffic volumes if implemented with high occupancy vehicle lanes and pricing programs.

- Bicycling Individuals can bicycle to reach a place of employment or a destination like the train station or other transit stop. Support facilities like bicycle-compatible roadways, bike lockers at train stations and workplaces, and showers available at work enhance the use of bicycling as a viable alternative to driving alone. TMAs support bicycling by promoting "bike to work days," bike lockers at rail and bus stations, land use changes, developing bike maps and planning routes. TMAs also participate in the NJDOT Bicycle Advisory Council and have partnerships with local bike clubs and retail outlets. Bicycling is most likely to be of interest to employees who live within 5 miles of their work site.
- **Walking** A person can walk to a bus stop, train station, or to his/her workplace. Sidewalks and other amenities such as bus shelters can help promote walking as a viable alternative to driving alone. Walking to work is most likely to be of interest to employees that live within 1 mile of their work site. The threshold for walking to transit is generally no more than ½ mile.

4.2.2 Alternative Work Arrangements

These strategies are alternatives to the normal 9 to 5 work day. They enable commuters to avoid traveling during the peak morning and evening travel times. TMAs provide advice and support for telecommuting, flextime and compressed work week alternatives.

- Telecommuting/Teleworking This strategy allows employees to work at home on one or more days during the week and is most commonly used by employees on Mondays or Fridays. In addition to permitting employees to telecommute, employers can support this strategy by providing any necessary computer equipment, fax machines, and additional telephone services. This strategy can work well for individuals who can work independently and for a variety of job types.
- Flexible Work Hours Spreading the demand for travel over a wider band of time through alternative work hour programs is a demand management technique. Staggered work hours, where different groups of employees are assigned to different starting times, or shifts, is one technique. Staggered work hours can work well for back office and assembly line operations.

Flex-time is another technique where individual employees can choose a flexible start time, usually between 7:00 AM and 9:30 AM, to which they then adhere. Like telecommuting, flex-time works well for office workers who work independently and can exercise discretion over the scheduling of their work.

It is important to note, however, that flexible work hours can make inter-company and intracompany vanpooling much more difficult and carpooling problematic because it increases organization and communication needs and may reduce the critical mass of participants needed to ensure a successful program. It should also be noted that flexible work hours may have to be implemented with labor unions under collective bargaining agreement for some employees.

 Alternative (Compressed) Work Weeks – This strategy provides employees the opportunity to work longer days in exchange for a day off; for example a 4/40 schedule would allow employees to work four ten-hour days and have the fifth day off. Similarly, a 9/80 schedule would allow an employee to work 80 hours in a nine day period with the tenth day off. This strategy has a double impact on commuter travel in that one day of commuting is eliminated and the longer day moves the commuter trip out of the peak hours of travel. However, similar to flex-time, compressed work weeks can negatively impact other TDM programs such as carpooling and vanpooling.

4.2.3 Financial Incentives

The following strategies can be used to induce individuals to use an alternative mode of travel rather than driving alone:

- Commute Alternative Subsidies To encourage employees to vanpool or use public transportation to get to and from work, employers can offer a federal tax-free fringe benefit of up to \$100 per month. This direct subsidy allows employees to not only save money by not driving, but also to reduce the cost of their monthly commute. In addition, as noted previously, New Jersey TRANSIT will offset the costs of qualifying vanpools by \$150 a month.
- Parking Cash Out Employers using this strategy offer employees the option to choose cash in lieu of non-taxable parking subsidies. Since employers can provide tax-free parking (up to

\$170/month) to employees, employees are likely to take advantage of it. But if employers provide cash in lieu of parking, employees may be motivated to seek an alternative to driving alone.

- Tax Incentives Tax incentives such as payroll tax deductions for employers that implement commute alternative subsidies or parking cash out are available at the federal level. New Jersey also offers employer tax incentives and challenge grants; however they require substantial record keeping.
- Value Pricing When higher rates are charged for peak periods at highway toll facilities, drivers are encouraged to travel during non-peak periods. The New Jersey Turnpike Authority currently uses value pricing. Another value pricing strategy involves use of high occupancy toll (HOT) lanes. HOT lanes are a hybrid to high occupancy vehicle lanes (HOV) that allow single occupancy vehicles to use HOV lanes at higher prices and based on congestion in HOV lanes (vanpools, carpools and buses still drive in the HOV lane for free). For this strategy to be successful, an intelligent transportation system (ITS) control system is needed to monitor congestion and track usage.

TMAs support a full complement of financial incentives for employees that include Commuter Choice – 132(f) programs, EPA-Best Work Places, Smart Moves for Business, NJDOT Employer Service programs, Local Government Challenge programs and TMA devised promotion programs.

4.2.4 Parking Management Programs

The following strategies relate to methods for either encouraging or discouraging use of a singleoccupant automobile: **The greatest inducement to driving alone is free parking.**

- **Preferential HOV (High-Occupancy Vehicle) Parking** Employers can provide parking spaces closer to the building entrances for employees who carpool or vanpool.
- **Parking Fees** Charging for parking at employment sites will provide a disincentive to employees who drive alone.
- **Parking Supply Reduction** When employers reduce the number of parking spaces available at workplaces, employees are encouraged to find alternatives to driving alone.

TMAs provide support for effective parking management strategies and solutions in the communities they serve. For example, some TMAs can: provide parking utilization assessments for employers and municipal government; develop brokered shared lot and offsite parking plans for rail and bus stations and preferred parking plans at employment sites; promote park and ride lots; manage special event parking; prepare distribution materials on parking regulations; and work with municipalities on ordinance changes.

4.2.5 Land Use Initiatives

These strategies encourage the use of transit, bicycling, or walking, or mandate or negotiate a reduction in the use of single-occupant vehicles.

• Site Design – New facility design should encourage transit, bicycling, and walking trips by locating buildings close to roadways so that walking and bicycling distances are minimized. In

addition, locating buildings close together in office parks supports carpooling, vanpooling, and transit use by making passenger pick up and drop off more convenient.

- **Trip Reduction Ordinances** Municipalities can use their regulatory authority to limit the use of cars in new developments. Developers and/or employers can be required to show a reduction in the number of auto trips to a specific site. With such ordinances in place, developers and/or employers need to implement travel demand strategies.
- Negotiated Demand Management Agreements Municipalities can enter into traffic mitigation agreements with developers and/or employers. These negotiated agreements set traffic reduction goals. The agreements can be non-prescriptive (for example, they can specify the number of vehicle trips to be eliminated but not identify the strategies to reach the number) or they can be prescriptive in that they identify specific actions required to carry out the intent of the agreement.
- **TMAs** can support local land use initiatives through primary and remedial TDM site assessments, support smart growth and transit-oriented development planning efforts, participate in working groups and encourage the adoption of trip reduction ordinances and plans.

4.2.6 Supporting Programs

The following programs increase the effectiveness of the travel demand reduction strategies identified previously:

- Guaranteed Ride Home This program provides a safety net for employees who use transit, carpool, or vanpool. The program provides a ride home for employees using one of these modes who have an emergency during the day or are required to work late. The ride home can be a taxi, a company vehicle, or other vehicle. Many TMAs administer such a program, including RideWise TMA and Keep Middlesex Moving TMA.
- **Commute Centers** These centers provide/distribute information such as transit schedules, rideshare applications and other materials promoting commute options. RideWise has 30 such sites established in Somerset County.
- Ride Matching The New Jersey Department of Transportation (NJDOT) provides funding to TMAs to offer ride matching for persons looking to carpool or vanpool. The TMAs supply lists of persons, including their home areas, work locations, and similar work hours so that matching can occur.
- **On-Site Facilities at Work Location** Concierge services like on-site dry cleaning pick up and delivery, postage stamp purchases, etc., can support people who use alternatives to driving alone by eliminating some of the trips for which they would need their cars. Employers can also facilitate on site programs by designating a transportation coordinator at the worksite.
- **Park & Ride Facilities** Parking at rail and bus stations, including drop-off areas, provides opportunities to reach transit facilities and not make the total commute by auto. TMAs have information on the park and rides in their service areas.
- Shuttle Services Shuttle bus service from residential areas to train stations provides an opportunity to not have to use an automobile to get to the train station. NJ TRANSIT's community shuttle program provides a transit vehicle to host communities to set up shuttle

services to area train stations. Operating funds and vehicle maintenance must be provided by the community sponsoring the shuttle.

- Station Cars Vehicles, usually electric, are provided at train stations to be used by groups of employees to reach their work destinations. Currently 3 such vehicles are used at the Princeton Junction train station. Greater Mercer TMA administers this program on behalf of NJDOT and NJTRANSIT. Station cars are also located at the Morristown station, with TransOptions administering that program. Employer owned station cars/vans are another option for helping employees travel from the station to the work site.
- Employer vehicles for work purposes Employer vehicles purchased for work purposes and for offsite meetings make it easier for employees that use alternate means to travel for business purposes during the workday.
- Bicycle & Pedestrian Amenities Bicycle lockers and showers at workplaces are amenities that can encourage bicycle use. Bicycle lockers at train stations also support bicycling. Bicycle-compatible roadways and bike paths add to the ability to use bicycling as a viable commute alternative. Sidewalks and bus shelters support walking.
- Advance Traveler Information System This support program provides real-time information about road and transit service conditions. A person can alter his trip time based on information indicating that a roadway is congested because of an accident or there are rail transit delays. For a commuting driver this can mean moving the trip out of the peak period and thus reducing congestion.

To implement the above strategies and support programs, the private sector, the public sector, or both need to take responsibility. Table 4.1 identifies the parties typically responsible for implementing each of the strategies and support programs discussed above.

Strategy or Support Program	Responsible Party
Transit	NJ TRANSIT, counties, private bus companies and TMAs
Carpool	Employee and/or Employer with Support from TMA
Vanpool	Employee and/or Employer with Support from TMA
Bicycle	Employee with Support from Employer and TMA
Walk	Employee with Support from Employer and TMA
Telecommuting	Employer with Support from TMA
Flexible Work Hours	Employer with Support from TMA
Alternative (Compressed Work Week)	Employer with Support from TMA
Commute Alternative Subsidies	Employer, TMA, NJ TRANSIT
Cash Out Parking	Employer with support from TMA
Tax Incentive	Federal & State Governments and TMA
Value Pricing	Toll Authorities and TMA
Preferential HOV Parking	Employer, Parking Authorities (at rail stations) and TMA

Table 4.1: Travel Demand Management Implementation Matrix

Parking Fees	Developer and TMA
Parking Supply Reduction	Developer, Municipality and TMA
Site Design	Municipality and TMA
Trip Reduction Ordinances	Municipality and TMA
Negotiated Demand Management Agreements	Developer, Municipality and TMA
Guaranteed Ride Home	Employer & Support from TMA
Ride Matching	Employee and Employer with Support from TMA
On-Site Facilities at Work Location	Developer, Employer and TMA
Park & Ride Facilities	NJDOT & NJ TRANSIT and TMA
Shuttle Services	Employer & Support from TMA
Station Cars	Employer (TMA Administers Program)
Bicycle & Pedestrian Amenities	Employer, NJ TRANSIT, NJDOT, Municipalities & TMA
Advance Traveler Information System	Private Sector/Government Agencies and TMA

4.3 Community Survey Results

As described in Chapter 3, a survey of study area employers, workers and residents was conducted to solicit public input regarding existing conditions and various strategies under consideration as part of the I-287 Mobility Plan study. The overwhelming majority of study area workers surveyed (96%) reported "usually" driving alone to work. When asked if they would consider commuting to work using an alternative mode, nearly half (48%) said "yes." A follow-up question asked those workers who responded that they would consider using an alternate mode to travel to and from work, which alternatives they would consider. Table 4.2 shows their responses.

Table 4.2. Mode options Workers are Winnig to consider		
Alternative to driving alone	No.	Percent
Car/van-pool as a driver	21	36%
Car/van-pool as a passenger	34	58%
Public transit or shuttle bus	45	76%
Walking	2	3%
Bicycling	5	8%

Table 4.2: Mode Options Workers are Willing to Consider

Workers were also asked a series of questions related to which, if any, TDM strategies and support programs were offered by their employer to encourage the use of commute options. Table 4.3 indicates which strategies and programs are currently offered by area employers (based on the respondents' knowledge). In general, the vast majority of workers surveyed were unaware of whether or not their employer offered or supported TDM strategies and support programs and very few responded affirmatively that strategies were currently being offered by area employers. When asked to rank the TDM strategies and support programs, workers expressed no clear preferences among the strategies and programs listed.

Table 4.3: TDM Strategies and Programs Currently Offered by Study Area Employers

Strategy or Support Program	Current No.	<u>tly Offered</u> Percent	Don't Know No Percent		
TDM Strategies					
Flextime	47	40%	57	48%	
Alternative or compressed work week	20	17%	85	73%	
Telecommuting	34	29%	75	64%	
Commute alternative subsidies	7	6%	104	91%	
Employer-subsidized vanpool	2	2%	104	91%	
Employee-directed vanpool	6	5%	96	86%	
Preferrential car/van-pool parking	6	5%	100	88%	
Parking "cash-out"	0	0%	112	99%	
Parking fees for employees	4	4%	108	96%	
Reduced/limited parking at employment site	0	0%	111	99%	
Support Programs					
Emergency ride home	3	3%	100	92%	
Ride-matching	3	3%	101	90%	
On-site transportation coordinator	2	2%	101	93%	
On-site services	13	12%	93	84%	
Concierge services	2	2%	105	96%	
Amenities for employees that walk or bike to work	13	12%	95	86%	
Station cars	6	6%	101	93%	
Employer-sponsored shuttle services	7	6%	99	91%	
Information and promotional materials relate to TDM	5	5%	98	88%	

Study area employers were also surveyed. Table 4.4 indicates which strategies and programs are currently offered by area employers and which they might be interested in for the future. Interestingly, many of the individuals surveyed reported being unaware whether their company offered TDM strategies/support programs and/or ambivalence as to whether they would be willing to consider such programs in the future. When asked to rank TDM strategies in order of preference, employers were most interested in: flextime, alternative/compressed workweeks, telecommuting and preferential car/van-pool parking. When asked to rank support programs, employers preferred: emergency ride home, concierge services, amenities for employees that walk or bike to work, ride-matching services, and on-site services such as daycare and cafeterias. When asked "how interested is your company in promoting the use of commute options," three employers expressed strong interest, three expressed some interest and 2 were not at all interested.

	Is Willin			ng to Offer		
	Currently Offer		in the Future		<u>Don't Kn</u>	<u>ow / Not Sure</u>
	No.	Percent	No.	Percent	No.	Percent
TDM Strategies						
Flextime	4	44%	0	0%	5	56%
Alternative or compressed work week	0	0%	1	13%	7	88%
Telecommuting	0	0%	1	13%	5	63%
Commute alternative subsidies	1	13%	2	25%	5	63%
Employer-subsidized vanpool	1	13%	0	0%	8	100%
Employee-directed vanpool	0	0%	1	11%	7	78%
Preferrential car/van-pool parking	1	11%	1	11%	7	78%
Parking "cash-out"	0	0%	0	0%	8	100%
Parking fees for employees	0	0%	0	0%	8	100%
Reduced/limited parking at work site	0	0%	0	0%	8	100%
Support Programs						
Emergency ride home	3	38%	2	25%	3	38%
Ride-matching	0	0%	2	29%	5	71%
On-site transportation coordinator	1	13%	1	13%	6	75%
On-site services	2	25%	0	0%	6	75%
Concierge services	1	14%	0	0%	6	86%
Amenities for employees that walk or bike to work	1	13%	1	13%	6	75%
Station cars	0	0%	1	14%	6	86%
Employer-sponsored shuttle services	2	25%	0	0%	6	75%
Information and promotional materials related to TDM	1	13%	2	25%	5	63%

Table 4.4: TDM Strategies and Programs Currently Offered by Study Area Employers

4.4 Expanding the Use of TDM in the Study Area

Based on stakeholder input from the business community and local officials, it appears that the use of TDM strategies and programs in the study area is likely to remain limited for the foreseeable future. This is due to a variety of reasons, which include but is not limited to the following:

- There are few meaningful financial incentives for employers or employees to sponsor or participate in TDM programs;
- The study area contains a diverse employer base which includes many smaller businesses;
- Today's workforce is very mobile, with many individuals splitting time between multiple worksites;
- Currently, there is a high office vacancy rate;
- Work locations in the study area are often satellite offices or part of larger multinational corporations, so, fewer employers in the study area make employee benefit decisions at their local work site. Decisions are often made at headquarter offices located elsewhere; and
- The layout of existing development and general lack of pedestrian, bicycle and transit infrastructure discourage the use of commute options.

In addition, it is important to note that the success of TDM depends partly on other strategies such as fostering transportation-efficient development, enhancing and expanding transit options and improving pedestrian and bicycle facilities and amenities. Within this cautionary framework, the following strategies are recommended to expand the use of TDM in the study area:

4.5 Strategies

1. Increase financial and other incentives for employers and employees to encourage the use of commute options.

Studies have shown that drive-alone commuting can be reduced by providing financial incentives to workers and residents to change the way they travel. There are a variety of financial incentives available. As previously described, examples include subsidized or free transit passes, rideshare subsidies and cash in lieu of parking rewards. A 1993 national study conducted by Comsis Corporation found that drive alone commuting in a low-density suburban setting could be reduced from 2-17% with a daily rideshare subsidy of \$1-4.

a. Promote and expand the use of tax-free transportation fringe benefits programs – There are two types of programs. The first involves *employer provided direct subsidies* to employees who commute by transit or vanpool (e.g., employer purchased transit passes). These subsidies can be up to \$100/month. The employee receives a \$100 tax-free transportation benefit. Employers get a tax deduction for the expense and benefit from savings on payroll-related taxes. The second type of program involves *employee paid pretax transportation savings* accounts. Employers can allow employees to set aside up to \$100/month of pre-tax income to pay for transit or vanpooling. Once again, employers benefit from savings on payroll taxes for the amount set aside by the employee. Employees benefit because the set aside is not counted as income and therefore not subject to income tax.

As needed, Somerset County, Middlesex County, Franklin Township, Piscataway Township, representatives from local and regional chambers of commerce and business associations and area employers should work with state government agencies and the legislature to reduce the financial and administrative burdens of administering existing programs.

- b. Implement a pilot parking cash-out program in the study area As explained earlier in this chapter, parking cash-out provides commuters who currently receive free parking the opportunity to trade their free parking for a cash reward. Such rewards most often are monthly or annual cash bonuses for participating in the program. Studies have shown that parking cash-out can reduce drive alone commuting an average of 17%. Studies have also found that parking cash-out participants most often choose ridesharing as their means of commuting to work. A voluntary parking cash-out pilot program should be developed that targets study area employers in Franklin and Piscataway Townships. The program should include subsidies to employers to offset some of the cost of the program and the identification and recruitment of one or more "leadership" employers to participate.
- c. Promote and expand the use of "fill-er-up" programs that provide gasoline gift cards to individuals that sponsor or participate in a carpool or vanpool In March 2005, RideWise began offering a "fill-er-up" program. The program has attracted some

participants and will be re-launched in the near future. NJDOT has planned a similar program. A program specifically targeting Franklin and Piscataway Township employees and residents should be planned and marketed.

- d. **Require preferential carpool and vanpool parking at worksites in the study area.** Most employment locations within the study area have ample free on-site parking; however, in many instances, a significant portion of the parking is located distant from building entrances. Municipal ordinances should be amended to require developers and property owners to designate a certain number of close-in parking spaces for carpool and vanpool parking.
- e. Encourage employers to offer paid time off in lieu of parking Some employers may be unwilling to provide direct commute alternative subsidies to their employees. As an alternative, employers should be encouraged to offer employees paid time off if they commute by alternative mode. For example an employee could earn up to 1 hour of paid leave time each day they commute to work by means other than driving alone. Paid leave time up could be capped at some specified maximum (e.g., 1 day per month or 3 days per year).

2. Target TDM outreach efforts directly to individual employees and residents.

The traditional model for promoting TDM programs is through employer sponsored activities; however, changes in business culture over the past decade have resulted in smaller firm sizes, a more mobile workforce, and more satellite work locations. Today employers are less likely to engage in promoting commute option programs than they were 10-15 years ago. A new TDM marketing strategy should be developed for the study area. The approach should target study area residents and employees and combine elements of "social marketing" and "individualized marketing." Social marketing involves "...community-based programs to encourage socially desirable behavior." The concept has been used successfully in various high profile health and safety campaigns such as those related to smoking and seat belt use. Individualized marketing attempts to customize the information provided to specific individuals or small groups of individuals, providing detailed information specific to their unique needs.

3. Increase coordination related to TDM planning and implementation.

Congestion in the study area affects the local business and economic climate. There are a number of parties that have an important stake in expanding the use of TDM strategies as a way to reduce travel demand and congestion in the interchanges area. To be successful, the efforts of various governmental, nonprofit and business groups must be coordinated better. Business associations, local and regional chambers of commerce, and economic development agencies should become more proactive in promoting awareness related to TDM benefits and programs. In addition, they should take greater advantage of existing TMA resources and promote business partnerships that support the efforts of the study area's two TMAs.

4. Encourage the use of TDM strategies as part of the local land development process.

An important way to encourage the use of TDM programs is to encourage consideration of TDM strategies as part of the land use and development process. As noted above, this can be done in a variety of ways.

- a. Amend land development ordinances to promote the use of commute alternatives Franklin and Piscataway Townships should amend their zoning and site plan ordinances to require transit-friendly site design and the provision of bicycle and pedestrian facilities and amenities as part of the site development process.
- b. Adopt voluntary trip reduction ordinances Piscataway and Franklin Townships should consider adopting voluntary municipal-wide trip reduction ordinances designed to reduce the number of vehicles entering and exiting study area work sites during peak hours. Such ordinances would encourage employers/property owners to develop and monitor trip reduction plans for their site. Typically plans include trip reduction goals, a program of specific strategies to be used to achieve the goals and a monitoring mechanism to evaluate how well the goals are achieved. There are many examples from around the country of successful programs.
- c. Negotiate travel demand management agreements Absent a local ordinance requiring mandatory trip reduction, Franklin and Piscataway Townships should attempt to negotiate traffic reduction agreements with existing study area employers, property owners and developers during the site plan approval process. As noted earlier, these negotiated agreements set traffic reductions goals. The agreements can be non-prescriptive (for example, they can specify the number of vehicle trips to be eliminated but not identify the strategies to reach the number) or prescriptive in that they identify specific actions required to carry out the intent of the agreement.
- d. Create a trip credit trading program Franklin and/or Piscataway Townships should explore the potential for creating a market-based approach to trading peak period trip credits. Such a program could be modeled after transfer of development rights programs and pollution credit programs. This would require the development of an area-wide traffic plan that fixes a "traffic quota" for each site based on condition of full build-out and/or full employment. Businesses would then be allowed to trade credits back and forth to achieve reductions in traffic, allowing certain businesses to buy additional credits from businesses that implement aggressive TDM programs.

5. Increase the viability of alternative transportation modes.

The success of TDM depends partly on other strategies such as fostering transportation-efficient development, enhancing and expanding transit options and improving pedestrian and bicycle facilities and amenities.

5.0 TRANSIT CONDITIONS AND STRATEGIES

5.1 Introduction

Transit services can offer travelers through the I-287 Corridor an alternative to driving in singleoccupancy vehicle. While the study area offers some transit services, additional options can provide incentive for changes to travel patterns, resulting in improved mobility throughout the corridor. This document presents a summary of existing transit and land use conditions, an analysis of modes which could best be incorporated into the existing transit, and conceptual planning of recommended transit improvements to maximize mobility through the study area.

5.2 Existing Conditions

5.2.1 Transit Services

Transit service in the study area is most strongly aligned with commuter patterns providing access to regional employment centers. New Jersey Transit offers substantial commuter rail service at three rail stations located just outside of the study area (New Brunswick and Edison to the south and east; Bound Brook to the northwest). Service is based on the major regional destinations (primarily Newark and Trenton, New Jersey, and New York City, New York). New Jersey Transit buses and contract shuttle buses offer connecting service to a broader set of regional destinations including malls, civic centers, and educational facilities, as well as circulator and feeder services operating along residential and office routes throughout the area. Amtrak is also accessible nearby to the study area at the New Brunswick rail station, providing transit service to destinations beyond the region.

Figure 5.1 and Table 5.1 present the transit operations serving the study area, including headways, spans, and major route destinations, as well as routes which provide direct connectivity at the rail stations, located within close proximity to the study area's boundaries.



I-287 Mobility Plan - Existing Transit Services

Source: NJGIN, Orth-Rodgers & Associates, & ESRI.

0

		Daily		Weekday	Headways		Weekend	Headways		
	Services	Weekday Trips	AM Peak	Midday	PM Peak	Night	Sat. Midday	Sun. Midday	Span*	Major Route Destinations
Ne	w Brunswick									
	NJT Rail (NEC)	55	15	30	15	30	30	30	21/7	New York City (Penn Station), Newark
	Amtrak	4	1 Trip	1 Trip	1 Trip	1 Trip	1 Trip	1 Trip	12/7	New York City (Penn Station), Newark
pound	NJT 810	16	60	60	60	60	60	60	15/7	Woodbridge Center, Menlo Park Mall,
	NJT 811	12	60	60	60	60	none	none	11/5	North Brunswick Shopping, East Brunswick Civic Center, Brunswick Square Mall
orth	NJT 814	29	30	30	30	60	60	none	14/6	Middlesex County College
N/punc	NJT 815	16	60	60	60	60	60	60	14/7	East Brunswick Transportation Center, Mid-State Mall, Woodbridge Center Mall
Eastbo	NJT 818	14	60	60	60	45	60	60	13/7	East Brunswick Transportation Center, Brunswick Square Mall, Browntown Shopping Center, Rotary Senior Citizen Complex
	NJT 980	5	45	none	75	none	none	none	11/5	Piscataway Municipal Complex
	DASH - SC2	2	none	none	60	none	none	none	2 trips	
	Coach USA	7	60	none	120	none	none	none	11/5	Middlesex Mall, Dunellen NJT Railroad Station
_	Jamesburg/8A Shuttle	10	60	60	60	none	none	none		New Brunswick station, North Brunswick Shopping Center, Jameburg, Rossmor, M. Access Road (NJTurnpike Exit 8A)
					10					
	NJT Rail (NEC)	56	30	30	10	15	30	30	21/7	Trenton, NJ
punoq	Amtrak	1	1 Trip	none	none	none	none	none	AM peak only	Trenton, Philadelphia, Washington D.C.
uthl	NJT 810	17	60	60	60	60	60	60	16/7	Rutgers University
<u>/</u> So	NJT 811	12	60	60	60	60	none	none	11/5	
pound	NJT 814	30	30	30	30	60	60	none	14/6	Pathmark Shopping Center, North Brunswick Shopping Center, DeVry College of Technoloy, Technology Center of New Jersey
/est	NJT 815	17	60	60	60	60	60	60	16/7	Rutgers University
\$	NJT 818	14	60	60	60/90	90	60	60	14/7	Rutgers University
	NJT 980	4	1 Trip	none	30	none	none	none	9/5	Rutgers University

Table 5.1: Existing Transit Services

I-287 Mobility Plan

	DASH - SC2	2	60	none	none	none	none	none	2 trips	
	Coach USA	5	30/90	none	120	none	none	none	12/5	New Brunswick Park and Ride lot, Princeton Palmer Square
										New Brunswick station, North Brunswick Shopping Center,
	Jamesburg/8A Shuttle	19	60	60	60	none	none	none		Jameburg, Rossmor, M. Access Road (NJTurnpike Exit 8A)
Bour	nd Brook									
	NJT Rail (RV)	26	15	60	60	60	60	60	19/5	New York City (Penn Station), Newark
p	NJT 65/66	2	1 trip	none	1 trip	none	none	none	8/5	Bridgewater Commons Mall, Newark
our	NJT 114	23	30	60	30	60	60	60	20/7	Bridgewater Commons Mall, New York City (Port Authority)
astb	NJT 117	3	30	none	none	none	none	none	AM Peak/	5 New York City (Port Authority)
— Ea	DASH - SC1	4	60	none	none	none	none	none	3/5	Bridgewater Promenade "Big Box" stores, Somerset Ball Park, South Bound Brook Office District and Hotels
	NJT Rail (RV)	30	60	60	15	60	60	60	20/7	Trenton, NJ
-					-				AM Peak	
oun	NJT 65/66	2	2 trips	none	none	none	none	none	Only	Bridgewater Commons Mall, Newark
tbo	NJT 114	29	30	30	30	60	30	60	20/7	Bridgewater Commons Mall, New York City (Port Authority)
Ves	NJT 117	4	non	none	30	none	none	none	AM Peak/	5 New York City (Port Authority)
>-	DASH - SC1	4	none	none	60	none	none	none	3/5	Bridgewater Promenade "Big Box" stores, Somerset Ball Park, South Bound Brook Office District and Hotels
Edis	on									
ןיח חמו	NJT Rail (NEC)	49	15	30	15	60	30	30	21/7	New York City (Penn Station), Newark
stbou rthhn	NJT 810	16	60	60	60	60	60	60	15/7	Woodbridge Center, Menlo Park Mall
N La	NJT 814	16	60	60	60	60	1 trip	none	15/6	Middlesex County College
) Juiind	NJT Rail (NEC)	48	30	30	15	30	30/60	60	21/7	Trenton, NJ
	NJT 810	17	60	60	60	60	60	60	16/7	Rutgers University
Westt South	NJT 814	16	60	60	60	60	1 trip	none	15/6	Rutgers University, Pathmark Shopping Center, North Brunswick Shopping Center, Technology Centre of New Jersey, DeVry College of Technoloy

* Span = weekday operating hours over weekly days of operation.

 New Jersey Transit Railroad Services – New Jersey Transit Railroad currently serves the New Brunswick and Edison stations along its Northeast Corridor Line (NEC), while serving Bound Brook station via the Raritan Valley Line (RV). Service levels along the NEC line reflect a high level of travel demand at the regional level, most notably for commuter trips to and from New York City. The line provides one-seat connections to Trenton, Newark, Newark-Liberty International Airport, and New York City 365-days a year, with service averaging no more than one-hour headways over a 21-hour span.

New Jersey Transit also provides rail service to the study area via the Bound Brook station. This station is served by the Raritan Valley line, which terminates to the west at High Bridge. The Raritan Valley line provides service to New York City, but requires a transfer; service along this line is also less frequent than along the NEC.

- Amtrak Amtrak makes four daily eastbound stops and one daily westbound stop at the New Brunswick rail station, offering regional connections to Philadelphia, Trenton, Newark, New York City, and beyond.
- New Jersey Transit Bus Services New Jersey Transit provides local and feeder bus services throughout the study area, offering access to residential, commercial, and office destinations. These services include:

NJT 65/66 – The 65/66 Bus provides fixed-route service between Somerville and Newark, passing through the Borough of Bound Brook and Middlesex County. It makes limited stops in Bound Brook during weekday AM and PM peak periods, and operates just one westbound bus on early Saturday mornings.

NJT 114 –The 114 Bus operates daily between Bridgewater Commons Mall in Somerville and New York City's Port Authority Bus Terminal, making fixed-route stops in Bound Brook at 30-minute peak, and 30-60 minute off-peak headways. Weekday service spans 20 hours from early mornings to late nights. Weekend service is slightly more constricted, with 15 hours of service on both Saturday and Sunday.

NJT 117 –The 117 Bus offers limited weekday express service between Somerville and New York City's Port Authority Bus Terminal. Three eastbound buses stop in Bound Brook during the AM peak, with four westbound buses offering service at Bound Brook during the PM peak.

NJT 810 – The 810 Bus service operates along a fixed-route between the Rutgers University campus in New Brunswick and the Woodbridge Center in Woodbridge. Buses operate seven days a week with one-hour headways. Weekday and Saturday service runs from the morning peak through the evening, while Sunday service operates from late morning to early evening.

NJT 811 – The 811 Bus service is a weekday-only fixed-route service running between Saint Peter's Hospital in New Brunswick and downtown South River. Service operates in the AM peak, midday, and PM peak periods with one-hour headways.

NJT 814 – The 814 Bus service operates along a fixed-route between North Brunswick and Edison, with an intermediate loop through central New Brunswick. Buses operate weekdays and Saturdays, with 30-minute headways during the AM and PM peak period on weekdays, and with hour-long headways during evenings and on Saturdays.

NJT 815 – The 815 Bus service operates along a fixed-route between the Rutgers University campus in New Brunswick and the Woodbridge Center shopping center in Woodbridge. Buses operate seven days a week maintaining hour-long headways. Weekday service operates during the AM peak, midday, and PM peak periods. During weekends, service to Woodbridge runs from the late morning into late evening and includes nighttime service, while service to New Brunswick begins earlier in the morning and operates only into the evening.

NJT 818 – The 818 Bus offers seven-day fixed-route service between Rutgers University and the Old Bridge Civic Center, with stops at the East Brunswick Transportation Center, Brunswick Square Mall, and the Browntown Shopping Center. Eastbound and westbound buses operate at 60-minute headways and operate from the AM peak period into the late evening. Saturday service operates from late morning to late evenings, while Sunday service operates from midday to evening.

NJT 980 – The 980 Bus is a weekday-only contractor-operated bus route, offering service between Rutgers University and the Piscataway Municipal Complex. This is a peak-only service limited to five eastbound buses and four westbound buses each weekday. Based on limited field observations, ridership on the NJT 980 bus appears to be modest. On the days of observation, approximately 14 passengers utilized the service on each run. All passengers boarded at the two stops in New Brunswick, while alightings were spread evenly along the Centennial Avenue employment corridor. Upon alighting, passengers appeared destined for a mix of offices and commercial destinations along Centennial Avenue and Knightsbridge Road.

 DASH Shuttle Buses – The Davidson Avenue Shuttle (DASH) is a weekday shuttle service offered by Somerset County. Though it is scheduled to operate along a specific route and timetable, field surveys have indicated that drivers alter the routes mid-ride to accommodate riders' requests. There are two DASH shuttle routes, running from the train stations at New Brunswick and Bound Brook to businesses in the Davidson Avenue section of Franklin Township.

DASH – SC1 –The SC1 Bus operates between Bound Brook (including the NJ TRANSIT station) and Somerset, providing four runs in the AM peak to Somerset at 60-minute headways and four buses back to Bound Brook during the PM peak. Morning and afternoon service operates at 60-minute headways. Based on limited field observations, ridership on the SC1 is also modest. On the days of observation a maximum of 15 passengers used the service; this peak occured at the Davidson Avenue Corridor, where passengers alight at hotels and office complexes. Passengers on the return trip generally consisted of students boarding from residential stops in South Bound Brook and alighting

at Bound Brook High School. Peak observed ridership on the return trip was 11 passengers.

DASH – SC2 – The SC2 Bus runs between New Brunswick (including the NJ TRANSIT station) and Somerset, providing two runs in the AM peak to Somerset (one hour apart), and two buses back during the afternoon peak. Certain runs during the peaks also provide service to Bound Brook. Based on limited field observations, the DASH SC-2 carried a peak ridership of 22 passengers, with all riders boarding at the New Brunswick train station. All of these passengers alighted at Franklin Township stops, appearing destined for nearby shopping centers, hotels and office buildings. All eight passengers boarding along the route alighted at the New Brunswick rail station.

- Coach USA Buses Coach USA offers "Suburban Bus Service" which provides coach service runs during peak hours. This service operates between the New Jersey Transit rail stations at Dunellen and New Brunswick, and includes a stop at the Middlesex Mall. A total of seven eastbound and five westbound buses, averaging 60-minute headways, operate Monday to Friday.
- Edison Light Transit Edison Light Transit operates two weekday bus services. During the
 morning and evening commute peaks, buses run across the township at approximately 30minute headways, bringing residents to and from the rail station. During the midday, two routes
 offer roughly hourly service to a dozen or so commercial destinations as well as the train
 station.
- Jamesburg/8A Shuttle The Middlesex County Department of Transportation operates a shuttle bus between the New Brunswick station and Jamesburg, New Jersey. This hourly weekday service between provides access to destinations in North Brunswick, South Brunswick, and work locations in the vicinity of Exit 8A of the NJ Turnpike. Service between New Brunswick station and Jamesburg begins at 6:45 AM and runs hourly until 4:00 PM. Service between Jamesburg and New Brunswick station begins at 8:00 AM and runs hourly until 4:50 PM.

5.2.2 Land Use

The study area is bounded generally by I-287 to the north; the Raritan River, John F. Kennedy Boulevard and Amwell Road to the south; Stelton Road and the Edison Township and Highland Park Borough borders to the east; and Randolph Road to the west. Single-family residential and undeveloped land account for over half of the land uses in the study area (approximately 25 percent each). Industrial, institution, parks/recreation, agricultural, and office add between approximately five and ten percent. All remaining land uses combine to account for just over another ten percent. Table 5.2 presents the distribution land uses throughout the study area, and provides a ranking by acreage.

The study area is suburban, with residential and commercial sections. It also contains a major portion of the Rutgers University campus, on the north side of the Raritan River. The residential areas typically are characterized by low density, middle to lower income housing. The principal commercial areas are the Centennial Avenue Corridor in Piscataway Township, and the Davidson

Avenue Corridor in Franklin Township. They contain a mix of employment locations in the service and manufacturing industries, as well as over 10 hotels. The principal commercial areas are the Centennial Avenue Corridor in Piscataway Township, and the Davidson Avenue Corridor in Franklin Township. They contain a mix of employment locations in the service and manufacturing industries, as well as over 10 hotels.

Land Use	Acres	% of Total	Ranking
Single-family Residential	4,745	27.3%	1
Multi-family Residential	683	3.9%	8
Office	790	4.5%	7
Commercial/Retail	312	1.8%	10
Hotel	102	0.6%	13
Community Facilities	99	0.6%	14
Institution	1,481	8.5%	4
Agricultural	1,086	6.2%	6
Undeveloped	4,190	24.1%	2
Parks/Recreation	1,188	6.8%	5
Industrial	1,872	10.8%	3
Transportation/Utility	414	2.4%	9
Vacant	146	0.8%	12
Water	273	1.6%	11
Total	17,381	100.0%	

Table 5.2: Study Area Land Uses

While all major land use categories are represented in the study area, there is very little mixing of land uses within each district. Residential densities throughout the study area are generally low, ranging from 1-15 units per acre in Piscataway to 0.33 to 6 units per acre in Franklin. Employment densities are also generally low, with stand-alone office buildings set far back from street frontages surrounded by large surface parking lots which provide free parking for employees; these areas are not generally conducive to transit use and pedestrian activity, offering few sidewalks, bicycles routes, or transit amenities. Figure 5.2 presents the population densities and key employment centers within the study area. As seen in the figure, most of the study area is categorized as low density. Moderately higher residential densities are located along River Road, south of Centennial Avenue, and in the central and eastern portions of Piscataway Township. Key employment corridors include Centennial Avenue in Piscataway Township, and Davidson Avenue and Cottontail Lane in Franklin Township.



Figure 5.2: I-287 Mobility Plan - Population Density and Key Employment Locations

Source: NJGIN, Orth-Rodgers & Associates, & ESRI.



5.2.3 Unserved Trip Generators

The areas of higher population, employment, and mixed-use densities frequently generate the greatest number of peak hour trips, and therefore offer the greatest potential for transit ridership. Locations with higher densities that are not currently served by transit and where the hours of transit operations are limited will be the focus of proposed transit improvements in the following sections. The following land uses have key trip generator characteristics and are not currently served by transit, indicating the location may have unmet demand for transit. Provision of appropriate transit services to these locations is anticipated to capture a portion of the trips generated, and provide improved mobility through the I-287 Corridor.

- Mid-Density Residential Districts The Birchview Gardens and Mayflower garden apartment developments located along River Road north of I-287 (exit 9) combine to provide a density of approximately 17 units per acre. This is as dense as any area within the study area including those successfully supporting transit services. Based on the characteristics of these residential developments and in comparison with the Centennial Avenue Corridor which currently supports transit services, this is an area with the potential for transit demand that could result in improving mobility through the I-287 Corridor.
- Office Park/Hotel Corridors Areas that have been developed with office parks and hotels
 offer significant opportunities to provide transit. Employees in these corridors include office
 and service workers who frequently travel during the AM and PM peak hours, and without
 transit options many would drive through the I-287 Corridor. The Cottontail Lane/ Elizabeth
 Avenue/Campus Drive area (south of I-287, exit 12) is a prime example of this type of
 development and offers the potential for transit demand.
- Commercial Centers North-south transit routes serving the study area are limited and do
 not cover the eastern portion of Piscataway Township. In contrast, field observation of AM
 peak hour trains revealed that the Edison railroad station is a daily commuter route for
 employees who travel north to the Piscataway Town Center/ Centennial Square/ Centennial
 Plaza. While providing transit services between the railroad station and this commercial center
 may not shift existing drivers from the I-287 Corridor, such a service may encourage future
 commuters to utilize transit instead of driving through the study area.
- **Cumulative Trip Generators** Development throughout the study area has frequently occurred in pockets, with multiple uses of similar intensities located near each other, but far beyond walking distance from other pockets. Where these pockets are of sufficient size, residents and/or employees may be willing to utilize transit services, if connecting to appropriate locations. One example of this land use pattern is in the southern portion of Franklin Township, where the Municipal Complex, The Manor Assisted Living community, and the Jewish Home for the Aged are all located within approximately 2,000 feet of each other. While the DASH SC-2 service is currently being rerouted to include the Jewish Home for the Aged, it does not continue south along Demott Lane to serve the nearby Municipal Complex or the Manor Assisted Living community. These three locations have the potential for significant unmet demand from municipal, health care, and community facility employees, as well as

residents. In addition, transit service to these three locations could be provided at a significant economy of scale compared to serving any individual site.

 Significant Undeveloped Acreage – Just north of the Birchview Gardens and Mayflower residential development on the east side of River Road is a +125-acre undeveloped parcel. If developed at sufficient density and with appropriate pedestrian amenities, this site could be a prototype for future transit-conscious development; if not, development of an auto-dependent site could result in exacerbated traffic volume conditions through the I-287 Corridor.

5.3 Alternatives Analysis

This section describes the initial screening analysis of alternative transit modes to identify the potential modes that best satisfy the project's goal of reducing vehicular volumes through the I-287 Corridor. Each mode will be qualitatively analyzed for fatal flaws, key advantages, and disadvantages, based on the criteria presented in Table 5.3.

	IVes Analysis	
Criteria	Measure	Rationale
	High	
Ridership capacity	Medium	Supply
	Low	
	High	
Population/employment densities	Medium	Demand
	Low	
	High	
Order-of-magnitude cost estimates	Medium	Cost
-	Low	

Table 5.3: Evaluation of Criteria for Alternatives Analysis

Each mode will be evaluated to determine which ones best address existing transit deficiencies by providing appropriate transit capacity at reasonable costs. This will be defined as modes that provide a supply, demand, and cost at equivalent measures (i.e., high supply for high demand could justify a high cost; however, low supply which does not meet a high demand would not justify a high cost). The mode(s) which are deemed to best address the study's needs will be recommended for conceptual-level planning.

The following modes and elements were evaluated as part of this analysis:

- Commuter Rail;
- Light Rail Transit (LRT);
- Bus Rapid Transit (BRT);
- On-Street Bus Services;
- Pedestrian and Bicycle Network; and
- Bus Complements.

• **Commuter Rail** – New Jersey Transit Railroad currently serves the New Brunswick and Edison stations along its Northeast Corridor Line, while serving Bound Brook station via the Raritan Valley Line. Service levels along the NEC line reflect the high level of travel demand at the regional level, most notably for commuter trips to and from New York City. The line provides one-seat connections to Trenton, Newark, Newark Liberty International Airport and New York City 365-days a year, with service averaging no more than one-hour headways over a 21-hour span.

New Jersey Transit rail service at Bound Brook provides service to the Somerset County and Newark along the Raritan Valley line. Service to New York City requires a transfer.

There are three basic options for expanding the existing commuter rail network:

- Construct a new alignment and new stations within the study area;
- Construct new stations along one or more of the existing alignments; and
- Increase frequency of service along existing alignments at existing stations.

Because of the large capacity of commuter trains, all options offer a High supply of additional transit capacity.

Due to the extensive physical infrastructure required for construction, operation, and maintenance, the first two alternatives carry High cost ratings. The third option carries a significant amount of additional operating expense for existing lines, and is therefore rated with a Medium cost.

Present levels of NJT Rail service appear fairly well-matched to levels of demand for regional transit in the study area. Presently, trains run at minimal headways during peak times, offer sufficient capacity to avoid crowding, and compete favorably with auto-commuting (and parking) in terms of travel times and cost. Therefore, increasing the rail service within the study area is anticipated to draw existing transit riders from other stations, and possibly increase peak hour vehicle trips through the study area. Additional rail service would not be addressing the demand from within the study area; demand is therefore rated Low for these options.

Since demand would not justify the High cost of constructing new rail alignments or stations, these options are not recommended. While increasing commuter rail service would be a much lower cost, the demand is also not present; therefore, it is not recommended as a method to improve mobility through the I-287 Corridor (see Table 5.4).

Table 5.4. Commuter Ran Options						
Option	Supply	Demand	Cost			
New Alignment	High	Low	High			
New Stations	High	Low	High			
Increase Frequency	High	Low	Medium			

Table 5.4: Commuter Rail Options

• Light Rail Transit – Light Rail Transit (LRT) systems are an increasingly popular alternative to heavy rail construction in areas where transit demand is sufficient to support new, high capacity rail services. LRT eliminates the high cost of constructing segregated, electrified

tracks by running off of overhead or below-grade electrification, similar to trolley systems, or locomotive power. This allows LRT to operate within existing automotive rights-of-way, and provide significantly lower operations and maintenance costs that commuter rail.

While operating and maintenance costs are significantly lower than heavy rail, LRT does still carry a high cost of implementation. LRT has been effective in attracting ridership along corridors experiencing heavy traffic congestion; however, LRT routes are typically much longer than the corridor being studied. Candidate LRT corridors also tend to have high density commercial districts along their alignments, drawing ridership from multiple directions. Without these two characteristics, the existing land uses are not anticipated to generate sufficient demand for this modal option. Based on the Low projected demand and the High cost involved, LRT is not recommended for further consideration (see Table 5.5).

Table 5.5: Light Rail Options

Option	Supply	Demand	Cost				
Construct LRT	High	Low	High				

 Bus Rapid Transit – Bus Rapid Transit (BRT) refers generally to the provision of exclusive bus rights-of-way, priority treatments, and enhanced bus stops or stations to improve capacity and reliability. BRT is intended to address the delays associated with local bus operations in mixed traffic with curb bus stops. The BRT vehicle may be a single unit or articulated vehicle, providing a High supply of transit capacity.

BRT provides the benefits of an exclusive right-of-way and station stops without the expense and visual impacts associated with the construction of tracks and/or power supply systems required by rail transit. Pre-payment of fares can be addressed at station platforms and lowfloor vehicles are frequently used in BRT systems, both to further reduce boarding delays. Due to the shorter dwell times permitted by fare pre-payment, use of low-floor vehicles and all-door boarding, as well as the reduced operational delays allowed by the dedicated right-of-way, frequency of service can be increased, and travel times decreased, compared to the performance of on-street bus services. Additionally, low-emission diesel and/or alternate fuel buses could be utilized to reduce air quality impacts.

While BRT compares favorably with LRT and commuter rail in terms of cost, this option still carries a High level of implementation cost, including such capital expenses as roadway reconfiguration, as sufficient width must be obtained to provide an isolated right-of-way. Since many of the higher volume roadways throughout the study area consist of one or two lanes in each direction, constructing a BRT alignment would require acquisition of private property to provide sufficient width, resulting in a High construction cost for this mode.

Like LRT, BRT has proven effective in competing with highways along congested commercial corridors. Like LRT again, however, BRT typically requires a longer corridor and a high density commercial district to generate significant demand. In the study area, BRT would be expected to generate only a Low level of demand. Due to the High construction cost compared to the Low demand, BRT is not recommended for further analysis (see Table 5.6).

Table 5.6: Bus Rapid Transit Options

Option	Supply	Demand	Cost			
Construct BRT	High	Low	High			

On-Street Bus Services – On-Street Bus service generally consists of buses circulating through local communities and commercial districts, typically starting and ending routes at intermodal connection points. Since On-Street Bus service already exists within the study area, improvement to this mode is an attractive option for a number of reasons. First, unlike LRT and BRT, operators are familiar with the area's market, and residents are familiar with the service. Secondly, established maintenance facilities already exist, providing a core infrastructure upon which to build and offering a significant cost savings. All On-Street Bus options, which build on the existing bus system, are therefore projected to provide at least a Medium supply of transit capacity.

There are three basic options for expanding the existing On-Street Bus network:

- Adding new geographic coverage;
- Increasing frequencies and spans along existing routes; and
- Re-routing or consolidating existing service to better reach areas of demand.

Three bus routes currently serve portions of the study area. The ability to capture significantly more trips would correlate with coverage of high density locations which are currently unserved, providing service at times with sufficient demand which are currently not served, and/or maximizing the efficiency of the existing services to more effectively move them through the I-287 Corridor.

Since new or increased service would require the purchase of new vehicles and hiring of additional staff, the first two options each carry a Medium cost of implementation. The third option, which requires reallocation of existing resources, carries a Low cost.

Existing service spans and frequencies vary among the three routes which serve the study area. Currently, service is provided only during peak hours with between two and five runs in each direction. Compared to other On-Street Bus services provided outside of the study area, the service within the study area is nominal and may be hindering effectiveness. The option of increasing the temporal coverage along existing routes can be a very effective way of putting a user-friendly "face" on transit, and attracting at least a Medium ridership demand.

As previously described (see "Land Use"), development throughout the study area has occurred in pockets, with multiple uses of similar intensities located near each other, but far beyond walking distance from other pockets. Due to their flexible routing and scheduling characteristics, On-Street bus services are well suited to providing transit to new pockets of development. New bus routes may be implemented to serve new land uses that generate a large number of trips. Service may be tailored to accommodate these riders at a Medium cost, based primarily on the number of vehicles, drivers, and maintainers required.

Re-routing, and possibly consolidating, existing bus lines is also a valuable option for this area. The opportunity exists to create a connection across the Raritan River at I-287, which would

connect residents of the eastern portion of the study area to both the Centennial Avenue corridor and Bound Brook train station. The options for reroutings and consolidations are anticipated to provide a Medium increase in ridership demand.

With Medium supply, Medium demand and Medium cost ratings, all three of the On-Street Bus service options are recommended for further examination (see Table 5.7).

Table	5.7:	On-Street Bi	us Options
1 4010	•		a optiono

Option	Supply	Demand	Cost
New Service	Medium	Medium	Medium
Increase Frequency	Medium	Medium	Low
Re-routing	Medium	Medium	Low

 Pedestrian and Bicycle Network – A key part of any transit network is a pedestrian and bicycle network which provides connectivity between origins, destinations, and modal transferor end-points. Nearly all transit trips incorporate walking, usually at the beginning and end of the trip. The quality of the connecting pedestrian environment therefore has a direct impact on how far people will walk to reach transit, and how often they will choose to do so.

The study area in both Franklin and Piscataway Townships is characterized by a relative scarcity of sidewalks. Residential districts tend to provide partial pedestrian infrastructure (i.e. sidewalks along one side of the street), while other districts provide little to no pedestrian support. Bicycle facilities are present throughout portions of the study area including within parks, along the D&R Canal, within the Rutgers campuses, and as part of multi-use paths.

Pedestrian and bicycle amenities that facilitate walking as a mode and support transit ridership include:

- Physical Separations, where pedestrian and bicycle traffic is buffered from auto traffic;
- Striped Routes, where the pedestrian and bicycle rights-of-way are clearly delineated;
- Sidewalk Furniture, such as attractive lighting, benches, plantings and newspaper boxes or stands (these features should be available, without hindering use of the pedestrian network); and
- Bike Storage (i.e., racks, lockers, etc), located at key destinations, as well as on buses and trains.

While improvements to the Pedestrian and Bicycle Network may not result in a significant increase in supply or demand, providing these options fosters the concept that alternatives to driving do exist and are feasible to utilize. Especially in a vehicular-focused corridor, providing these pedestrian and bicycle amenities is recommended as a Low cost investment to improving mobility (see Table 5.8). (Recommendations regarding the pedestrian and bicycle network are more fully described in a later chapter.)

Table 5.8: Pedestrian and Bicycle Network	Options
---	---------

Options	Supply	Demand	Cost
Physical Separation	N/A	Medium	Medium
Striped Routes	N/A	Medium	Low
Furniture	N/A	Low	Low
Bike Racks	N/A	Low	Low

Bus Complements – An often over-looked aspect of transit service is the quality of its physical
appearance in the community. A bus shelter is an opportunity not only to provide basic
weather protection, but also to provide riders with schedule information and potential riders
with the awareness of the ease and benefits of the service.

Another complement is the ease and availability of off-site provision of information. In order to attract new riders, information on schedules, frequencies, and spans needs to be promoted outside the service infrastructure. An example would be to place a web-link on the websites of key area trip-generators that re-directs viewers to the transit provider's website.

One key disadvantage of the existing bus routes that serve the study area is a consistent lack of visual infrastructure. Along the DASH routes (SC-1 and SC-2), there are very few shelters or bus stop signs, with no information regarding schedule. Another limiting factor of the existing service is that drivers have been documented to alter routes based on in-route passenger requests. While this flexibility increases rider appreciation, it results in preventing potential new riders from finding the service. For a person who does not currently utilize the service, finding out where and when the buses run is perceived as a very difficult task. Without bus stops or signage and without consistent routes, it is impossible for new riders to make rationale trip-making decisions. Without comfort in a reliable system, riders have no reason to utilize the transit system.

Bus Complements, in the form of weather-protected bus shelters, signage denoting bus stop locations and offering specific schedules, and marketing to notify the public of the service, offer the opportunity to capture new riders who want to use transit. These elements are anticipated to provide a positive perception of a well planned On-Street Bus service, therefore increasing demand at a Low cost. Therefore, considered in conjunction with improvements to the On-Street Bus service option, these elements are also recommended for further evaluation (see Table 5.9).

Options	Supply	Demand	Cost			
Bus Shelter Improvements	N/A	Low	Low			
Information Marketing	N/A	Low	Low			
General Marketing	N/A	Low	Low			

Table 5.9: Bus Complements

5.4 Conclusions

Evaluation criteria were established to determine appropriate transit modes for improving mobility through the I-287 Corridor. The evaluation of modes is summarized in Table 5.10.

The most significant flaws among the individual modes are disparities between cost and demand. The study area is marked by low-density development, and has an existing low-density based transit system. These two factors make high-cost investments in new modes difficult to justify. Among existing services, New Jersey Transit's commuter trains offer a particularly high level of service, making it unlikely for improvements to greatly boost its current market share. On-street bus service in the area however offers a fairly constricted level of service, especially in terms of frequencies, spans, and coverage. The bicycle and pedestrian network also offers a limited level of service within the study area. Its sidewalks and bicycle amenities suffer from the neglect common in auto-oriented districts. Improving bus complements (specifically bus shelters and the dissemination of service information) could be a cost effective way of broadening the appeal of existing transit services.

The following modal options are therefore recommended for further evaluation and planning as the most effective means for achieving the project goals:

- On-street bus service;
- Pedestrian and bicycle infrastructure; and
- Bus service complements.

Option	Supply	Demand	Cost	Recommendation
New Commuter Rail Alignment	High	Low	High	Not Recommended
New Commuter Rail Stations	High	Low	High	Not Recommended
Increase Commuter Rail Frequency	High	Low	Medium	Not Recommended
Construct Light Rail Transit	High	Low	High	Not Recommended
Construct Bus Rapid Transit	High	Low	High	Not Recommended
Add New On-Street Bus Service	Medium	Medium	Medium	Recommended
Increase Frequency of Existing Bus Service	Medium	Medium	Medium	Recommended
Re-Align/ Consolidate Existing Bus Routes	Medium	Medium	Low	Recommended
Increase Separation of Pedestrians and Vehicles	N/A	Medium	Medium	Recommended
Stripe Pedestrian and Bike Routes	N/A	Medium	Low	Recommended
Add/Improve Street/ Sidewalk Furniture	N/A	Low	Low	Recommended
Add Bike Racks at Key Destinations and on Buses	N/A	Low	Low	Recommended
Bus Shelter Improvements	N/A	Low	Low	Recommended
Distribution of Service Information	N/A	Low	Low	Recommended
Service Marketing	N/A	low	Low	Recommended

Table 5.10: Evaluation Summary

5.5 Strategies

1. Implement modifications to existing shuttle routes to serve more destinations.

Bus services are most effective and efficient when they provide access between multiple locations which each generate a large number of daily trips. However, several key trip generation locations within the study area are currently unserved by bus routes. By reconfiguring existing routes, travelers to these locations will have options to driving through the I-287 Corridor. The following route-specific concept plans are proposed based on modifications to existing bus routes and presented in Figure 5.3. Each concept plan includes a proposed schedule or frequency of service, proposed operator, and sources of funding aside from the transit operator, if available.¹

a. Route Amendment #1: DASH SC-2 – The DASH SC-2 currently provides service between the New Brunswick rail station and the Davidson Avenue commercial corridor. The route has recently been amended to travel south along Demott Lane, to serve the Jewish Home for the Aged, and return north on Demott Lane. While this recent route amendment provides service to one additional trip generator, two additional sites are located nearby which could also be served. By continuing the route two blocks south on Demott Lane, the DASH SC-2 could provide service to the residents of The Manor Assisted Living Community and government employees at the Franklin Township Municipal Complex. After looping through these two sites, the service could return north on Demott Lane and serve the route as recently proposed. The additional benefit of serving these two proposed sites is that both have access ways which loop through their sites, providing an opportunity for internal transit circulation.

While the additional leg of this proposed modification is valuable, the additional travel time may require adding a vehicle and driver to the route to provide timed connections to the rail service at New Brunswick Station.

b. Route Amendment #2: NJT 980 – In order to provide transit access to the commercial centers located in the northeastern portion of the study area, a route amendment to New Jersey Transit Bus Route 980 is proposed. The route is proposed to be extended at its furthest end at Centennial Avenue to continue east to Stelton Avenue. The key element of this route amendment would be to utilize the existing focus of the 980 Bus. The route is currently oriented to the centers of industrial and office employment along Centennial Avenue; the new extension would provide access to a new pool of commercial jobs.

Operation of the route would remain unchanged. However, in order to maintain the route's existing 60-minute headway, additional buses and drivers would be required.

¹ **NOTE:** Route proposals are conceptual only, based on land use and travel patterns. The recommendations are not warranted for safety or other site-specific considerations. Prior to implementation, all routes and bus stops must be reviewed and approved by the appropriate public safety, traffic engineering, and operations departments or agencies.



Figure 5.3: I-287 Mobility Plan - Proposed New and Amended Transit Services

Source: NJGIN, Orth-Rodgers & Associates, & ESRI.



2

Miles

Ω
c. Route Amendment #3: Coach USA – Coach USA currently operates a Suburban Bus Service route that runs along Stelton Road. Negotiation with Coach USA to make new stops at Centennial Avenue and the Edison rail station is anticipated to be a low-cost method to shifting travelers from driving along I-287 to utilizing transit.

2. Add new shuttle routes to serve areas not currently served by existing routes.

Following are route-specific concept plans for providing new bus service to currently unserved areas. Similar to strategy 1, each concept plan includes a proposed schedule or frequency of service, proposed operator, and sources of funding aside from the transit operator, if available.² Routes are illustrated in Figure 5.3.

a. New Route #1: Campus Drive Shuttle – This is proposed as a new employer-supported, DASH-operated commuter shuttle between the Bound Brook rail station and the employment centers along New Brunswick Road, Pierce Street, Belmont Drive, Cottontail Lane, and Campus Drive. This peak hour-only shuttle would run at half-hour headways during the AM and PM commuter peaks, which could be accomplished with one jitney vehicle running in continuous operation.

The proposed Campus Drive Shuttle would travel the following route:

- Starting at Bound Brook rail station, travel east along East Main Street;
- Turn south onto South Main Street;
- Continue onto Elizabeth Street;
- Turn west onto Campus Drive;
- Turn south onto Cottontail Drive;
- Turn east onto School House Road;
- Turn north onto Elizabeth Street;
- Turn east onto New Brunswick Road;
- Turn north onto Cedar Grove Lane;
- Turn west onto Pierce Street;
- Turn north onto Belmont Drive;
- Turn east onto Campus Drive;
- Turn north onto Elizabeth Avenue;
- Continue north onto South Main Street;
- Turn west onto East Main Street and returning to Bound Brook rail station.

This service is expressly designed to attract "choice" transit users off of I-287 by providing a quick shuttle between the train station and this nearby office corridor, which makes CMAQ funding one potential source of revenues. As a new route, new vehicles and personnel would be needed. Since this shuttle would be employee-focused, support from the business community would also be potential source of funding, with the route supported by a public/private partnership.

² **NOTE:** Route proposals are conceptual only, based on land use and travel patterns. The recommendations are not warranted for safety or other site-specific considerations. Prior to implementation, all routes and bus stops must be reviewed and approved by the appropriate public safety, traffic engineering, and operations departments or agencies.

b. New Route #2: Edison Light Centennial Avenue Shuttle (Alternative to NJT980 Route Amendment) – Edison Light Transit currently operates two weekday bus services. During the morning and evening commute peaks, buses run across the township at approximately 30-minute headways, bringing residents to and from the rail station. During the midday, two routes offer roughly hourly service to a dozen or so commercial destinations as well as the train station. There is a roughly ninety minute service gap between the commuter service and the commercial-oriented service, which presumably use the same buses.

Utilization of the vehicles during the existing service gaps could take the form of a direct shuttle service along Stelton Road, between the Edison rail station and the commercial core on Centennial Ave, east of Washington Avenue. This three-mile long route would take approximately 25 minutes round trip. This shuttle would provide commuter access instead of the proposed extension of the NJT 980 route, but offers two key advantages:

- An Edison rail station shuttle would provide a much faster and more direct connection to the Centennial Avenue destinations than the 980 Extension. The NJT 980 route is currently one hour long, before the extension past Washington Avenue. The new proposed stops would extend the route beyond the 60 minute mark. The length of this route would be a distinct disadvantage in competing with I-287, which offers an exit nearby at Washington Avenue.
- As the new service would be filling a previous gap, the new service could run as an express without reducing any established stops, further reducing the run times for the shuttle.

Within the 90-minute service gap offered within the existing schedule, a 2-bus shuttle service could offer four runs at 30-minute headways between 7:45 AM and 9:15 AM. The buses would then be available to service the midday routes.

A second gap in between the existing services occurs between 2:30 PM and 5:00 PM. While the existing Edison station route provides service starting at 5:00 PM, commuter ridership in anticipated to be low until 6:00 PM, when commuters leaving jobs in New York City, Newark, or Trenton at 5:00 PM or later would arrive in Edison. In order to utilize this break in service, the new shuttle could operate with the two buses from 4:00 PM to 5:00 PM. Between 5:00 PM and 6:00 PM, when fewer commuters are arriving at Edison Station, the existing Edison Light Transit schedule could be reduced from four runs to two. During this time, the second bus could service the new route at 30-minute headways. After 6:00 PM, both buses would serve the existing route, as per its existing schedule.

Funding and operation is recommended to be consistent with the existing Edison Light Transit services. The new service could be provided without the purchase of additional vehicles, however the elimination of service gaps may require additional operating personnel.

c. New Route #3: River Road/Centennial Avenue Shuttle – Investigation of a new route is recommended to serve the residential corridor along River Road north of I-287. A second component to serving these residences is to provide a connection to the Centennial Avenue corridor. According to the 2000 U.S. Census, approximately 300 trips are taken daily between the residential area and the office and industrial districts centered on Centennial Avenue.

In order to serve this demand, the following new route is proposed:

- Depart Bound Brook rail station, travel west on East Main Street;
- Turn south onto River Road;
- Turn east onto Centennial Avenue;
- Travel east along Centennial Avenue Corridor (within the Centennial Avenue Corridor, the route would serve internal roads of office parks); and,
- End at Stelton Road.

If desired, this route could also be amended to serve the medium density residential neighborhood in Piscataway between the Conrail tracks and the Raritan Valley Line. Under this scenario, rather than terminating at Stelton Road, the bus would turn north onto Stelton Road from Centennial Avenue. The bus would cross over I-287 and the Conrail tracks, and then loop through the New Market neighborhood bounded by New Brunswick Avenue and North Randolphville Road. The bus would then return to Centennial Avenue.

The route would travel as described in the AM peak and offer return service in the PM peak. Since this route would predominantly serve Middlesex County, it is recommended that the Middlesex County Department of Transportation operate the proposed new route. This agency currently operates the Area Wide Transportation System which provides non-fixed route transportation to seniors (60+), disabled, and other transportation dependent residents of Middlesex County. Funding for the new route may be available from a portion of the County's allocation of federal transit funds.

3. Modify existing schedules to include more frequent service, additional service runs to accommodate shift workers and to better connect with other transit services, especially trains arriving and departing from the New Brunswick and Bound Brook rail stations.

One critical facet to providing effective transit services is offering a schedule of service that operates at key times. A recent survey of employees within the study area indicated that over 40% of existing commuters would consider utilizing public transit or a shuttle bus, if available³. Peak trip generation within the study area is focused around commuter patterns; transit travel patterns are generally a function of train arrivals and departures from the New Jersey Transit rail stations. The existing on-street bus services are scheduled to offer easy connections at rail stations (see Tables 5.11 and 5.12). The following recommendations focus on modifying the existing schedules of the On-Street Bus services. These options are relatively low cost; no additional vehicles are required, however additional personnel are needed to operate the additional service.

a. **Connect to/ from New Brunswick Station** – The Dash SC-2 provides five buses arriving at the New Brunswick station between 6:42 AM and 8:04 AM, offering

³ I-287 Mobility Plan, Community Surveys, Table #124.

substantial AM peak hour service from the study area. One scheduling irregularity, however, results in two buses arriving at the station within 13 minutes and missing two critical train connections. The third run of the SC-2 arrives at New Brunswick station at 7:51 AM – one minute after the departure of the 7:50 AM train bound for Newark and New York City, and 9 minutes later than the 7:42 train bound for Trenton. This is a key gap in service, as these trains arrive at their destinations in the middle of the 8:00 – 9:00 AM hour. In order to provide bus service for commuters connecting with these trains, the preceding SC-2 runs leaving from and arriving at the New Brunswick station would need to depart ten minutes earlier. This amendment would significantly impact the overall operating schedule and is not recommended. Instead, a change of 2-3 minutes, to service the riders connecting only to the 7:50 train could be accommodated without other significant changes and is recommended.

The second recommended amendment to the SC-2 schedule would be to add one additional run at the end of the AM peak hour⁴. This additional run is proposed to leave New Brunswick station at approximately 8:25 AM and provide service through the study area for service sector jobs which start by 9:00 AM (similar to the last NJT-980 run).

Evening peak period bus service to the New Brunswick station is very limited, with both routes providing two in- and out-bound runs each. This existing schedule requires travelers to leave the study area by 5:00 PM or to be arriving back at New Brunswick station before 6:00 PM. This limited schedule does not offer much flexibility and limits the effectiveness for drawing riders. Extending the schedule for both the DASH SC-2 and NJT-980 to provide for one more run within the 7:00 PM hour is recommended. The addition of one AM run and one PM run would require additional driver time, potentially requiring the hiring of an additional driver.

In addition to coordinating better the DASH SC-2 schedule with NJT rail service at New Brunswick station, there is an opportunity to connect with Middlesex County's Jamesburg/8A Community Shuttle which operates hourly weekday service between the New Brunswick station and Jamesburg, serving destinations in North Brunswick, South Brunswick, and employment destination in the vicinity of Exit 8A of the NJ Turnpike. Service between New Brunswick station and Jamesburg begins at 6:45 AM and runs hourly until 4:00 PM. Service between Jamesburg and New Brunswick station begins at 8:00 AM and runs hourly until 4:50 PM.

b. **Connect to/ from Bound Brook Rail Station** – The DASH SC-1 route provides three trips in each direction during both the AM and PM peak hours, and provides connections at a reasonable schedule. Therefore, no changes to the DASH SC-1 schedule are recommended.

⁴ Planned surveys of DASH SC-1 and SC-2 riders in July 2005 will be utilized to provide passenger input on needed extension of the DASH schedules.

Bus Arrivals at New Brunswick Station Train Arrivals/ Departures Destinations Bus Departures from New Brunswick Station Route 1 6:28 Newark/ New York 6:42 Dash SC-2 Dash SC-2 6:42 6:42 Newark/ New York 6:49 NJT-980 Dash SC-2 7:02 Dash SC-2 7:02 Dash SC-2 Dash SC-2 7:02 7:21 Newark/ New York 7:33 NJT-980 Dash SC-2 7:02 7:25 Trenton/SEPTA - - 0 7:25 Trenton/SEPTA - - - 1 7:27 Newark/ New York 7:51 Dash SC-2 1 7:50 Newark/ New York - - 1 7:50 Newark/ New York - - 1 1 Trenton/SEPTA - - 2 8:18 Newark/ New York - - 1 8:19 Trenton/SEPTA - - 2 8:18 Newark/ New York	AM Peak		_	-			
Route Time Route 0 6:28 Newark/ New York 6:42 Dash SC-2 Dash SC-2 6:42 Newark/ New York 6:49 NJT-980 0 6:56 Newark/ New York 7:02 Dash SC-2 0 6:56 Trenton/SEPTA	Bus Arrivals at New Brunswick Station		Train Arrivals/ Departures	Destinations	Bus Departures from New Brunswick Station		
6:28 Newark/ New York 6:42 Dash SC-2 Dash SC-2 6:42 0:42 Newark/ New York 6:49 NJT-980 2 6:56 Trenton/SEPTA 2 2 2 2 2 2 2 3 NJT-980 7 2 3 NJT-980 7 3 NJT-980 7 3 NJT-980 7 3 NJT-980 7 3 Numark/ New York 1 3 <	Route	Time			Time	Route	
Dash SC-2 6:42 Newark/ New York 6:49 NJT-980 0 6:56 Newark/ New York 7:02 Dash SC-2 0 6:56 Trenton/SEPTA			6:28	Newark/ New York	6:42	Dash SC-2	
6:56 Newark/ New York 7:02 Dash SC-2 0ash SC-2 7:02 7:21 Newark/ New York 7:33 NJT-980 0ash SC-2 7:02 7:21 Newark/ New York 7:33 NJT-980 1 7:25 Trenton/SEPTA 1 1 1 1 1 7:27 Newark/ New York 7:51 Dash SC-2 1	Dash SC-2	6:42	6:42	Newark/ New York	6:49	NJT-980	
6:56 Trenton/SEPTA Dash SC-2 7:02 7:21 Newark/ New York 7:33 NJT-980 7:25 Trenton/SEPTA <td< td=""><td></td><td></td><td>6:56</td><td>Newark/ New York</td><td>7:02</td><td>Dash SC-2</td></td<>			6:56	Newark/ New York	7:02	Dash SC-2	
Dash SC-2 7:02 7:21 Newark/ New York 7:33 NJT-980 1 7:25 Trenton/SEPTA 1			6:56	Trenton/SEPTA			
7:25 Trenton/SEPTA 7:27 Newark/ New York 7:33 Newark/ New York 7:42 Trenton/SEPTA 7:42 Trenton/SEPTA 7:50 Newark/ New York 8:04 Dash SC-2 7:51 Bash SC-2 7:51 Newark/ New York 8:10 Trenton/SEPTA 8:10 Trenton/SEPTA 8:11 Trenton/SEPTA 8:12 Trenton/SEPTA 8:18 Newark/ New York 8:25 Newark/ New York 8:25 Newark/ New York 8:23 8:42 NJT-980 8:23 8:47 Newark/ New York 8:59 Trenton/SEPTA PM Peak Prese Bus Arrivals at New Brunswick Station Train Arrivals/ Departures Dash SC-2 4:00 4:26 NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 4:00 NJT-980 5:25 5:25	Dash SC-2	7:02	7:21	Newark/ New York	7:33	NJT-980	
Image: Product of the second			7:25	Trenton/SEPTA			
7:33 Newark/ New York 7:51 Dash SC-2 7:42 Trenton/SEPTA			7:27	Newark/ New York			
1 7:42 Trenton/SEPTA 8:04 Dash SC-2 Dash SC-2 7:51/ 8:04 8:10 Newark/ New York 8:04 Dash SC-2 Dash SC-2 7:51/ 8:04 8:10 Trenton/SEPTA			7:33	Newark/ New York	7:51	Dash SC-2	
T:50 Newark/ New York 8:04 Dash SC-2 Dash SC-2 7:51/ 8:04 8:10 Trenton/SEPTA			7:42	Trenton/SEPTA			
Dash SC-2 7:51/8:04 8:10 Newark/ New York 8:10 Trenton/SEPTA			7:50	Newark/ New York	8:04	Dash SC-2	
8:10 Trenton/SEPTA 8:18 Newark/ New York Dash SC-2 8:04 8:21 Trenton/SEPTA 8:25 Newark/ New York 8:25 NJT-980 NJT-980 8:23 8:42 Newark/ New York 8:25 NJT-980 8:23 8:42 Newark/ New York 9 8:47 Newark/ New York 9 9 9 8:59 Trenton/SEPTA 9 9 9 PM Peak 8:59 Trenton/SEPTA 9 9 Bus Arrivals at New Brunswick Station Train Arrivals/ Departures Destinations Bus Departures from New Brunswick Station Route Time 0 4:26 Newark/ New York 4:33 NJT-980 NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 1 5:05 Trenton/ SEPTA 1 1 1 1 1 1 1 1 1 1 1 1 </td <td>Dash SC-2</td> <td>7:51/ 8:04</td> <td>8:10</td> <td>Newark/ New York</td> <td></td> <td></td>	Dash SC-2	7:51/ 8:04	8:10	Newark/ New York			
8:18 Newark/ New York Dash SC-2 8:04 8:21 Trenton/SEPTA 8:25 Newark/ New York 8:25 NJT-980 NJT-980 8:23 8:42 Newark/ New York 8:25 8:47 Newark/ New York 8:59 1 1 PM Peak 8:59 Trenton/SEPTA 1 1 PM Peak 7 Destinations 8:00 1 1 Route Time 7 Destinations 8:00 1			8:10	Trenton/SEPTA			
Dash SC-2 8:04 8:21 Trenton/SEPTA Image: Constraint of the second			8:18	Newark/ New York			
Image: state of the s	Dash SC-2	8:04	8:21	Trenton/SEPTA			
NJT-980 8:23 8:42 Newark/ New York No. 8:47 Newark/ New York 8:59 Trenton/SEPTA 1000 PM Peak Train Arrivals/ Departures Destinations Bus Departures from New Brunswick Station Route Time Train Arrivals/ Departures Destinations Bus Departures from New Brunswick Station NJT-980 4:25 4:58 Trenton/SEPTA 4:58 Dash SC-2 Dash SC-2 4:00 4:26 Newark/ New York 4:33 NJT-980 NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 1000 1000 1000 5:05 Trenton/ SEPTA 10000 10000 10000 <td></td> <td></td> <td>8:25</td> <td>Newark/ New York</td> <td>8:25</td> <td>NJT-980</td>			8:25	Newark/ New York	8:25	NJT-980	
Not see Note Note Newark/ New York 8:59 Trenton/SEPTA Image: Second	NJT-980	8:23	8:42	Newark/ New York	0.20		
Bus Arrivals at New Brunswick Station Train Arrivals/ Departures Destinations Bus Departures from New Brunswick Station Route Time Destinations Bus Departures from New Brunswick Station Dash SC-2 4:00 4:26 Newark/ New York 4:33 NJT-980 NJT-980 4:25 4:58 Trenton/SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 2 Dash SC-2 4:58 5:02 Newark/ New York 2 Dash SC-2 4:58 5:02 Newark/ New York 2 Dash SC-2 4:58 5:05 Trenton/SEPTA 4:58 Dash SC-2 Dash SC-3 5:05 Trenton/SEPTA 2 2 2 2 2 2 2 2 2 2 2 2 2 3		0.20	8:47	Newark/ New York			
PM Peak State Train Arrivals/ Departures Destinations Bus Departures from New Brunswick Station Route Time Departures Destinations Bus Departures from New Brunswick Station NJT-980 4:25 4:26 Newark/ New York 4:33 NJT-980 NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:05 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 5:31 Newark/ New York 1			8:59	Trenton/SEPTA			
Bus Arrivals at New Brunswick StationTrain Arrivals/ DeparturesDestinationsBus Departures from New Brunswick StationRouteTimeNewark/ New York4:33NJT-980Dash SC-24:004:26Newark/ New York4:33NJT-980NJT-9804:254:58Trenton/ SEPTA4:58Dash SC-2Dash SC-24:585:02Newark/ New York105:05Trenton/ SEPTA1105:16Newark/ New York105:25Trenton/ SEPTA105:265:31Newark/ New York105:265:31Newark/ New York105:52Newark/ New York1105:52Newark/ New York1105:52Newark/ New York5:57Dash SC-205:52Newark/ New York5:57Dash SC-205:52Newark/ New York5:57Dash SC-206:20Newark/ New York1106:20Newark/ New York1106:26Newark/ New York1106:28Trenton/ SEPTA1106:28Trenton/ SEPTA1106:28Trenton/ SEPTA1106:24Trenton/ SEPTA1106:34Trenton/ SEPTA1106:34Trenton/ SEPTA110	PM Peak		0.00				
Route Time Time Route Dash SC-2 4:00 4:26 Newark/ New York 4:33 NJT-980 NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 4:58 Dash SC-2 Dash SC-2 5:16 Newark/ New York 4:58 1 1 NJT-980 5:26 5:31 Newark/ New York 5:45 NJT-980 S:26 5:31 Newark/ New York 5:57 Dash SC-2 1 5:58 Trenton/ SEPTA 5:45 NJT-980 G 5:58 Trenton/ SEPTA 4:52 4:52	Bus Arriva Brunswic	als at New k Station	Train Arrivals/	Destinations	Bus Depa Bruns	rtures from New wick Station	
Dash SC-2 4:00 4:26 Newark/ New York 4:33 NJT-980 NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York 1 1 Dash SC-2 4:58 5:02 Newark/ New York 1 1 Dash SC-2 4:58 5:02 Newark/ New York 1 1 1 Si:05 Trenton/ SEPTA 1<	Route	Time	Departures		Time	Route	
NJT-980 4:25 4:58 Trenton/ SEPTA 4:58 Dash SC-2 Dash SC-2 4:58 5:02 Newark/ New York	Dash SC-2	4:00	4:26	Newark/ New York	4:33	NJT-980	
Dash SC-2 4:58 5:02 Newark/ New York Image: Constraint of the second sec	NJT-980	4:25	4:58	Trenton/ SEPTA	4:58	Dash SC-2	
Stor OF 2 Note Stor OF 2 Note Stor OF 2 Note of the store Store <ths< td=""><td>Dash SC-2</td><td>4:58</td><td>5:02</td><td>Newark/ New York</td><td></td><td></td></ths<>	Dash SC-2	4:58	5:02	Newark/ New York			
Site Newark/ New York 5:16 Newark/ New York 5:25 Trenton/ SEPTA NJT-980 5:26 5:33 Trenton/ SEPTA 5:41 Trenton/ SEPTA 5:52 Numark/ New York 5:51 NJT-980 5:41 Trenton/ SEPTA 5:52 Newark/ New York 5:52 Newark/ New York 5:58 Trenton/ SEPTA 6:11 Trenton/ SEPTA 6:20 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA	200.002		5:05	Trenton/ SEPTA			
NJT-980 5:26 5:31 Newark/ New York 5:33 Trenton/ SEPTA 5:45 NJT-980 5:41 Trenton/ SEPTA 5:45 NJT-980 5:52 Newark/ New York 5:57 Dash SC-2 5:58 Trenton/ SEPTA 5:57 Dash SC-2 6:11 Trenton/ SEPTA 5:57 Dash SC-2 6:20 Newark/ New York 5:57 Dash SC-2 6:20 Newark/ New York 5:57 Dash SC-2 6:20 Newark/ New York 6:20 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA 6:34 Trenton/ SEPTA			5:16	Newark/ New York			
NJT-980 5:26 5:31 Newark/ New York 1 5:33 Trenton/ SEPTA 1 1 5:41 Trenton/ SEPTA 5:45 NJT-980 1 5:41 Trenton/ SEPTA 5:45 NJT-980 1 5:52 Newark/ New York 5:57 Dash SC-2 1 5:58 Trenton/ SEPTA 1 1 1 6:11 Trenton/ SEPTA 1 1 1 6:20 Newark/ New York 1 1 1 1 6:20 Newark/ New York 1			5:25	Trenton/ SEPTA			
Nor cool Size Norally Nor York 5:33 Trenton/ SEPTA 5:45 5:41 Trenton/ SEPTA 5:45 5:52 Newark/ New York 5:57 5:58 Trenton/ SEPTA 6:11 Trenton/ SEPTA 6:20 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA	NJT-980	5.26	5:31	Newark/ New York			
5:00 Trenton/ SEPTA 5:45 NJT-980 5:52 Newark/ New York 5:57 Dash SC-2 5:58 Trenton/ SEPTA 6:11 Trenton/ SEPTA 6:11 Trenton/ SEPTA 6:20 Newark/ New York 6:26 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA		0.20	5:33	Trenton/ SEPTA			
State Newark/ New York State New York 5:52 Newark/ New York 5:57 Dash SC-2 5:58 Trenton/ SEPTA 6:11 Trenton/ SEPTA 6:20 Newark/ New York 6:26 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA 6:34 Trenton/ SEPTA			5:41	Trenton/ SEPTA	5:45	N.IT-980	
5:58 Trenton/ SEPTA 6:11 Trenton/ SEPTA 6:20 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA			5:52	Newark/ New York	5:57	Dash SC-2	
6:11 Trenton/ SEPTA 6:20 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA			5:58	Trenton/ SEPTA	0.01		
6:20 Newark/ New York 6:26 Newark/ New York 6:28 Trenton/ SEPTA 6:34 Trenton/ SEPTA			6.11	Trenton/ SEPTA			
			6.20	Newark/ New York			
6:28 Trenton/ SEPTA			6.26	Newark/ New York			
6·34 Trenton/ SEPTA			6:28	Trenton/ SEPTA			
		1	6:34	Trenton/ SEPTA			

Newark/ New York

Trenton/ SEPTA

Trenton/ SEPTA

Table 5.11: Existing Bus/Train Connections (New Brunswick Railroad Station)

6:38

6:43

6:52

AM Peak						
Bus Arrivals at Bound Brook Station		Train Arrivals/ Departures	Destinations	Bus Departures from Bound Brook Station		
Route	Time			Time	Route	
		6:33	Newark/ New York			
		6:50	Somerville			
		7:00	Newark/ New York	7:08	Dash SC-1	
Dash SC-1	7:08	7:10	Newark/ New York			
		7:41	Newark/ New York			
		7:48	Newark/ New York			
		7:56	Somerville	8:00	Dash SC-1	
Dash SC-1	8:00	8:41	Somerville			
		8:46	Newark/ New York	8:50	Dash SC-1	
Dash SC-1	8:50	9:35	Somerville			
PM Peak						
Bus Arrivals a Sta	t Bound Brook tion	Train Arrivals/ Departures	Destinations	Destinations Bus Departures from Bound Brook Station		
Route	Time			Time	Route	
Dash SC-1	3:45	4:27	Newark/ New York	4:32/ 5:19	Dash SC-1	
Dash SC-1	4:32/ 5:19	5:21	Newark/ New York			
Dash SC-1	5:19	5:33	Somerville			
		5:41	Newark/ New York			
		5:59	Somerville			
		6:08	Somerville	6:10	Dash SC-1	
Dash SC-1	6:10	6:35	Somerville			
		0.20	Newark/ New York			
		6:39				
		6:39 6:46	Somerville			

Table 5.12: Existing Bus/Train Connections (Bound Brook Railroad Station)

4. Implement bus service complements to increase the visibility of existing services.

Transit service is only as effective as riders' ability to find it and use it. Bus service may be the mode most at-risk to losing potential ridership, since it offers few physical indicators: buses do not remain in one place, routes are not always intuitive, and schedules are difficult to deduce without assistance. These are the reasons why providing reliable geographic and temporal information about where and when bus service is available is often the key to a successful service. Table 5.13 presents recommendations that are complements to the previously described routes and schedules. However, whether new routes or schedules are implemented, the following improvements are anticipated to shift modal share and increase transit ridership within the study area. Each recommendation is considered low cost, and would be the responsibility of the agency operating each bus service.

Complement	Existing Deficiency	Recommended Measure	Recommended Route(s)
Bus Stop Signage	Locations of routes and stops	Installation of consistent signage	 DASH SC-1
	difficult to discern.	along routes	 DASH SC-2
Shelters	 Locations of stops difficult to 	 Installation of weather protective 	 DASH SC-1
	discern	bus shelters along routes	 DASH SC-2
	 Inclement weather decreases ridership potential 		• NJT-980
Schedules –	Schedule difficult to discern	 Installation of waterproof 	 DASH SC-1
Posted and	Schedule varies due to mid-	schedule displays	 DASH SC-2
Served	route requests	Instructions to drivers to maintain established schedule	• NJT-980
Route Maps –	Route difficult to discern	 Installation of waterproof route 	 DASH SC-1
Posted and	Route varies due to mid-route	map displays	 DASH SC-2
Served	requests	 Instructions to drivers to maintain established routes 	• NJT-980
Internet Access	Limited public awareness of	Outreach to key trip generators	DASH SC-1
	availability of transit services	for inclusion of link to operator's	 DASH SC-2
		website.	 NJT-980

Table 5.13: Bus Service Complements

6.0 SMART GROWTH LAND USE AND TRANSIT-FRIENDLY DESIGN

6.1 Introduction

The interrelationship between land use and transportation is well documented. Transportation planning and investment decisions affect land use and land use decisions affect travel behavior and transportation outcomes. Consider for example what sometimes happens when a new road is built or an existing road is widened. The initial result is increased mobility and accessibility for local and regional travelers. Yet, over time, the new roadway capacity is used up as travel patterns shift and new development occurs, sometimes in direct response to the improved mobility and accessibility.

Consider also what happens when new residential and/or non-residential growth occurs. Depending on where and how the development is built, transportation outcomes can be very different. For example, new housing built within a safe and convenient walk to commercial and retail development may generate a greater number of walk and bike trips. New office space built proximate to a transit stop may result in more transit use.

For the better part of three decades, planners and policy makers have been discussing and debating these and other relationships related to sustainable community development. Most recently the discussion/debate has galvanized around the concept of "smart growth." The New Jersey Department of Community Affairs (DCA) defines smart growth as "...well-planned, well-managed growth that adds new homes and creates new jobs, while preserving open space, farmland, and environmental resources." According to DCA, "...smart growth supports livable neighborhoods with a variety of housing types, price ranges and multi-modal forms of transportation."

The U.S. Environmental Protection Agency identifies the following 10 principles of smart growth:

- 1. Mix land uses
- 2. Take advantage of compact building design
- 3. Create a range of housing opportunities and choices
- 4. Create walkable neighborhoods
- 5. Foster distinctive, attractive communities with a strong sense of place
- 6. Preserve open space, farmland, natural beauty, and critical environmental areas
- 7. Strengthen and direct development towards existing communities
- 8. Provide a variety of transportation choices
- 9. Make development decisions predictable, fair, and cost effective
- 10. Encourage community and stakeholder collaboration in development decisions

Smart growth concepts have been incorporated into planning processes and documents at all levels in New Jersey, including: municipal master plans, county growth management plans, the NJ Department of Transportation Long Range Plan, Metropolitan Planning Organization regional transportation plans as well as the NJ State Development and Redevelopment Plan.

Given the relationship between land use and transportation and the smart growth planning context embraced by many planners and policy makers in New Jersey, it is appropriate to consider the role "smart" development and circulation planning and transit-friendly design could play in helping to improve travel conditions in the I-287 interchange area of Franklin and Piscataway Townships. The remainder of this element will describe existing land use conditions in the I-287 mobility plan study area, explore existing plans and zoning in Franklin and Piscataway townships relative to smart growth principles and suggest a variety of strategies to achieve more transportation-efficient land use patterns and better transportation outcomes in the study area.

6.2 Existing Conditions

The study area is bounded generally by I-287 to the north; the Raritan River, John F. Kennedy Boulevard and Amwell Road to the south; Stelton Road and the Edison Township and Highland Park Borough borders to the east; and Randolph Road to the west. It encompasses approximately 8,800 acres in Piscataway Township and 8,500 acres in Franklin Township.

6.2.1 Transportation Systems

I-287 runs from north to south through the study area. It is a six lane limited access freeway with interchanges at Easton Avenue (Exit 10) and Weston Canal Road (Exit 12) in Franklin Township and River Road (Exit 9), Possumtown Road (Exit 8), S. Randolphville Road (Exit 7), Washington Avenue (Exit 6), and Stelton Road (Exit 5) in Piscataway Township. The primary east-west roadways in the study area include: Easton Avenue in Franklin Township and River Road (CR622) in Piscataway Township. Secondary east-west roads include New Brunswick Avenue and Amwell Road in Franklin Township and Hoes Lane/Davidson Road, South Randolphville Road/Sutton Lane and Stelton Road in Piscataway. Secondary north-south roadways in Franklin include: John F. Kennedy Boulevard, Demott Lane, Cedar Grove Lane, Davidson Avenue and Elizabeth Avenue. Secondary north-south roadways in Piscataway include: Route 18/Metlar's Lane, Park Avenue/Morris Avenue and Centennial Avenue. These routes combine to form a very coarse grid pattern with varying degrees of road connectivity between and within super-blocks.

The study area contains very few sidewalks in non-residential areas and there are very few bicycle facilities. There are two primary transit services operating in the study area. These include:

- <u>NJ TRANSIT 980 (Wheels)</u> This shuttle bus serves destinations in Piscataway Township on Centennial Avenue, Knightsbridge Road, Hoes Lane and River Road. Service originates at the New Brunswick train station and includes 3 trips in the morning and 2 trips in the evening. Fares are \$1.10 each way.
- <u>Davidson Avenue Shuttle (DASH)</u> This shuttle bus has two routes. SC1 provides service between parts of Bridgewater Township and Bound Brook train station to destinations in Franklin Township along Davidson Avenue. SC2 provides service between the New Brunswick train station and destinations along Easton Avenue, JFK Boulevard, New Brunswick Road, and Davidson Avenue. These shuttles run once per hour between 6:30 – 8:30 am and 3:00-5:30 pm. Fares are \$1.00 each way.

6.2.2 Land Use

Existing land use conditions in the study area were documented using aerial photography and field observations. As is shown in Table 6.1, the dominant land use in the study area is single family residential which accounts for more than 4,700 acres or 27 percent of developed land. The study area also contains more than 3,000 acres of non-residential (office, commercial/retail and

industrial) development. More than 4,000 acres or approximately 24 percent of the study area is undeveloped.

	<u>Piscataway</u>		<u>F</u>	Franklin		Combined Study Area	
	Acres	% of Total	Acres	% of Total	Acres	% of Total	
Single-family Residential	2,542	28.7%	2,204	25.8%	4,745	27.3%	
Multi-family Residential	165	1.9%	518	6.1%	683	3.9%	
Office	558	6.3%	232	2.7%	790	4.5%	
Commercial/Retail	149	1.7%	163	1.9%	312	1.8%	
Hotel	17	0.2%	86	1.0%	102	0.6%	
Community Facilities	36	0.4%	63	0.7%	99	0.6%	
Institution	1,293	14.6%	188	2.2%	1,481	8.5%	
Agricultural	129	1.5%	957	11.2%	1,086	6.2%	
Undeveloped	1,908	21.6%	2,282	26.7%	4,190	24.1%	
Parks & Recreation	614	6.9%	574	6.7%	1,188	6.8%	
Industrial	1,036	11.7%	836	9.8%	1,872	10.8%	
Transportation/Utility	231	2.6%	184	2.2%	414	2.4%	
Vacant	57	0.6%	89	1.0%	146	0.8%	
Water	108	1.2%	165	1.9%	273	1.6%	
Total:	8,841	100.0%	8,540	100.0%	17,381	100.0%	

Table 6.1: Study Area Land Use

The study area is characterized by segregated, single-use, generally low-density development. Floor area ratios for non-residential districts in the study area range from approximately 0.5 to 0.75 in Piscataway and 0.2 to 0.5 in Franklin. Residential densities range from 1-15 units/acre in Piscataway to 0.33 to 6 units/acre in Franklin. As shown in Figure 6.1, land uses adjacent to Elizabeth Avenue, Davidson Avenue, and World's Fair Drive in Franklin Township are primarily non-residential. Similarly, land uses along Centennial Avenue, Hoes Lane, and South Randolphville Road in Piscataway Township are also primarily non-residential. Existing setbacks in these areas range from 50-100 feet or more. Free surface parking is plentiful. There are very few sidewalks in the commercial/industrial areas and there are very few transit amenities such as bus stop signs and shelters.



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\LandUses_11x17.mxd - 05/25/05

6.3 Smart Growth Planning Audit

The research team conducted a smart growth planning audit of Piscataway and Franklin townships' master plans and land development ordinances. Smart growth concepts related to transportation were emphasized. The audit was facilitated by a "smart growth checklist" created to help assess the degree to which Piscataway and Franklin Township have incorporated smart growth principles in their planning documents. Major review criteria contained in the checklist included:

- 1. Master plan incorporates State Plan concepts such as planning areas and centers;
- 2. Master plan includes a circulation element that encourages travel demand management and addresses multiples modes of transportation, including transit, walking, and biking;
- 3. Zoning code encourages mixed-use development (commercial and residential uses in the same building or district) at transit-supportive densities;
- 4. Land development ordinances include site design standards which enhance the pedestrian environment and promote walking, biking and transit use; and
- 5. Parking regulations incorporate techniques to encourage non-auto travel (e.g., maximum space requirements, shared parking strategies, credits for on-street parking and/or parking reductions when combined with trip reduction plans.

The following is a summary of findings from the audit:

6.3.1 Piscataway Township

- The township's master plan does not explicitly incorporate State Plan concepts. However, to a limited degree it incorporates language supportive of travel demand management (TDM) and transit use. For example, the master plan lists a number of good objectives, including:
 - Continue to establish a system of bikeways through the township which provide access from residential areas to schools, recreational areas, parks, other facilities and commercial service areas;
 - Locate future commercial and residential development along existing transit routes and in close proximity to existing developed areas;
 - Promote the use of van-pooling and other measures to ensure mass transit along the township's corporate corridors; and
 - Promote the use of mass transit systems and pedestrian modes of transportation.
- The master plan contains a basic circulation element; however, it is focused almost exclusively
 on roads and automobile travel. Beyond the above stated objectives, it does not specifically
 address pedestrian or bicycle facilities or transit services. Similarly, it does not include specific
 strategies and/or proposals designed to promote walking, biking or transit use.
- The township's zoning does not permit mixed-use development as of right. In some districts, retail and restaurant uses are permitted as conditional uses. No districts permit both residential and commercial uses as of right or as conditional uses within the same district.
- Floor area ratios in non-residential districts range from 0.5 to 0.75, which yields approximately 65 to 100 employees/acre⁵. Most residential districts permit only single-family detached

⁵ Employees/acre calculated based on 3 employees/1000 sq ft of gross floor area.

dwellings as of right. Densities range from 1 to 6 units per acre. Garden apartments at a density up to 15 units per acre are permitted as of right in only one district (R-M). Some districts permit planned residential development as a conditional use at densities ranging from 5-10 units per acre. With the exception of those associated with garden apartments and planned residential developments, land use densities permitted by the township are not transit compatible.

- The township's site plan review ordinance contains few guidelines or requirements oriented toward enhancing the pedestrian environment or promoting walking, biking and transit use. For example, the ordinance lacks specific guidelines or performance standards related to pedestrian and transit-friendly design (i.e., building setbacks and orientation, building fronts and entrances, building articulation and fenestration, ground floor window/transparency, parking location, pedestrian access, transit access, and pedestrian lighting standards). The ordinance does include a brief section addressing "street furniture;" however, the standards are general.
- The township's parking regulations do not include strategies intended to support smart growth principles. For example, as is typical in suburban locations, parking requirements are based on off-street minimum space standards. Maximum space limits are not used. Shared parking is not addressed and there are no incentives (e.g., parking reduction) to encourage trip reduction plans. Based on field observations, many sites in the study area appear to have excess parking capacity. A limited parking utilization study was conducted by the research team to confirm these field observations (see Table 6.2). Available parking and parking utilization rates were calculated for the following sites:

<u>Site No.</u>	Common Business Name	Land Use	Address
Site 1	Chanel - South Lot	Manufacturing	876 Centennial Avenue
Site 2	Chanel - North Lot	Manufacturing	876 Centennial Avenue
Site 3	IEEE	Office	445 Hoes Lane
Site 4	Johnson & Johnson	Office	425 Hoes Lane
Site 5	L'Oreal	Industrial	81 New England Avenue

|--|

	Net Usable Square Footage ⁽¹⁾	Percent of Building Currently Occupied ⁽²⁾	Required Spaces per Zoning Ordinance ⁽³⁾	Total Spaces Provided On-site	Percent Parking Occupied b/w 9:00 to 11:30 AM	Percent Parking Occupied b/w 1:30 to 3:30 PM
Site 1	283,900	100%	946	474	26.4%	52.1%
Site 2	202,400	100%	675	215	71.6%	70.7%
Site 3	160,934	100%	805	645	81.6%	81.4%
Site 4 Site 5	146,877 197,000	100% 100%	734 657	590 375	96.1% 73.1%	96.8% 79.5%

Footnotes:

(1) - To calculate the net usable square feet, 15% was deducted from total square feet of office building

(2) - Estimates provided by Piscataway Industrial Development Authority

(3) - Parking Requirements for Piscataway Township:

Office - 1 space for each 200 square feet of floor area

Industrial/Manufacturing - 1 space for each 300 square feet of floor area

It should be noted that although parking spaces were occupied at a higher level at the IEEE and Johnson & Johnson sites, parking ratios were changed in the Township ordinance since those sites were constructed. If the sites had been built under the new requirements, the parking survey in the peak hour would have indicated 280 vacant spaces at IEEE, and 163 vacant spaces at Johnson & Johnson.

6.3.2 Franklin Township

- The township's master plan acknowledges consistency with the NJ State Development and Redevelopment Plan, describes the location of planning areas boundaries and identifies five existing centers, including: Somerset, East Millstone, Middlebush, Kingston, and Griggstown. At the time the master plan was adopted (1999), the township was pursuing center designation for the Village of Kingston.
- The township's master plan includes a comprehensive circulation element that addresses non-auto travel modes. Smart growth oriented land use and transportation objectives stated in the plan include:
 - Encourage higher density housing in areas where existing services such as shopping, public transportation and community facilities are provided;
 - Encourage infill development within existing industrial districts rather than extending them further by increasing density while minimizing environmental impact;
 - Expand the list of permitted uses in industrial districts, recognizing new and emerging uses which should be directed to such districts;
 - Concentrate commercial development into nodes or districts in areas where residential densities can support such commercial activities;
 - Create more effective design standards for building and parking lot layout and siting;
 - Encourage connectivity between developments;
 - Discourage "single-outlet" design to increase local circulation;
 - Encourage the use of alternate forms of transportation (transit, bicycles) and develop a network of bicycle routes;
 - Support traffic calming measures; and
 - Enhance school bus, bicycle and pedestrian safety.
 - With regard to transit, the circulation element inventories existing services but makes very few specific recommendations relative to encouraging the use of transit and/or enhancing/expanding services. The only recommendations found in the plan relate to the creation of 2 bus pull-outs as part of the Route 27/Rennaissance 2000 corridor, which is located outside the study area.
 - The circulation element includes a discussion of pedestrian circulation, which includes references to traffic calming, identifies a number of pedestrian planning goals and states a focus on safe routes to schools. However, the only specific traffic calming and pedestrian improvement recommendations are for an area outside of the study area.

- The circulation element also includes a bikeway plan which identifies existing and proposed routes and sets forth general design standards for bicycle facilities. The plan also recommends that the township undertake the development of a comprehensive bikeway plan. Such a plan was adopted in 2001. It includes a program of specific recommendations which are more fully discussed in the bicycle and pedestrian element of the I-287 mobility plan.
- The circulation element incorporates a brief discussion of TDM strategies and techniques and recommends adoption of a traffic management ordinance to encourage the reduction of peak hour trips. Such an ordinance has not been adopted.
- With regard to congestion relief, the master plan recommends reducing residential densities throughout the township and discouraging non-residential uses that generate peak hour trips (e.g., additional office space). These strategies should be carefully considered because they may conflict with objectives aimed at encouraging greater TDM and transit use.
- Floor area ratios in study area non-residential districts range from 0.2 to 0.5, which yields approximately 25-65 employees/acre⁶. With the exception of the CR district, residential districts in the study area permit single-family residences at densities that range from 0.33 to 4 du/acres. In the CR district, zoning permits single family, duplex, townhouse and garden apartments at densities up to 6 du/acre. In some cases, the floor area ratios and residential densities permitted by zoning are compatible with local bus service, car pools and van pools; however, other study area characteristics such as separation of uses, building layout and orientation, lack of sidewalks, and abundant free parking discourage the use of alternative modes.
- With the exception of design standards targeted toward development in two special planning areas, the Hamilton Avenue Business District and the Route 27/Rennaissance 2000 corridor, neither of which is located within the study area, the township's development ordinance contains no specific guidelines or requirements intended to enhance the pedestrian environment or promoting walking, biking and transit use. For example, the ordinance lacks specific guidelines or performance standards related to pedestrian and transit-friendly design (i.e., building setbacks and orientation, building fronts and entrances, building articulation and fenestration, ground floor window/transparency, parking location, pedestrian access, transit access, and pedestrian lighting standards).
- The township's parking regulations include few strategies intended to support smart growth principles. Parking requirements are based on generous off-street minimum space standards. For example, 1 space/250 square feet of gross floor area for office uses. Maximum space limits are not used. Shared parking is permitted under limited circumstances and there are no incentives (e.g., parking reduction) to encourage trip reduction plans. Based on field observations, many sites in the study area appear to have excess parking capacity. A limited parking utilization study was conducted by the research team to confirm these field observations (see Table 6.3). Available parking and parking utilization rates were calculated for the following sites:

⁶ Employees/acre calculated based on 3 employees/1000 sq ft of gross floor area.

Site No.	Common Business Name	Land Use	Address
Site 1	Zinnser	Warehouse/Distribution	301 Cottontail Lane
Site 2	The Tower Office Building	Office	270 Davidson Avenue
Site 3	Phillips Lighting	Office	Franklin Square Drive
Site 4	Rotor Clip	Industrial/Manufacturing	187 Davidson Avenue
Site 5	Med Pointe	Office	265 Davidson Avenue

Table 6.3:	Parking	Utilization	at Selected	Sites in	Franklin	Township
	i winning	Otheation	at 0010010a	01000111		10 millionip

	Net Usable Square Footage ⁽¹⁾	Percent of Building Currently Occupied ⁽²⁾	Required Spaces per Zoning Ordinance ⁽³⁾	Total Spaces Provided On-site	Percent Parking Occupied b/w 9:00 to 11:30 AM	Percent Parking Occupied b/w 1:30 to 3:30 PM
Site 1	122,558	100%	123	63	46.0%	44.4%
Site 2	176,098	86%	704	712	39.7%	41.3%
Site 3	136,371	100%	545	698	43.8%	44.6%
Site 4 Site 5	150,288 176,361	100% 93%	242 705	239 703	75.3% 42.1%	77.8% 41.0%

Footnotes:

(1) - To calculate the net usable square feet, 15% was deducted from total square feet of office building

(2) - Estimates provided by Franklin Township Economic Development Office

(3) - Parking Requirements for Franklin Township:

Warehouse/Distribution - 1 space for each 1000 square feet of gross building area

Office - 1 space for each 250 square feet of net usable floor area

Industrial/Manufacturing - 2 spaces for every three plant employees; 1 space for each personnel

6.4 Community Survey Results

As described in Chapter 3, a survey of study area employers, workers and residents was conducted to solicit public input regarding existing conditions and various strategies under consideration as part of the I-287 Mobility Plan study. Specifically, community residents were asked to provide their opinions relative to a number of smart growth land use strategies.

Almost 400 Piscataway and Franklin Township residents participated in the survey and expressed their views. Residents were asked to provide their opinions relative to a number of smart growth land use strategies. Table 6.4 provides a summary of survey results. It is evident from the responses that there is significant public support for almost all of the suggested strategies. Of particular note is the number of residents that expressed support or strong support for locating new buildings close to the street with parking in the rear (78%); making sure building fronts are oriented to the street (91%); encouraging mixed-use development (77%), retrofitting existing developed areas with a mix of land uses (81%), as well as the overwhelming support expressed for strategies designed to improve conditions for pedestrians and transit users.

Smart Growth Strategy	Strong Support	Support	Do Not Support
Cluster new buildings close together to make it easier to walk between buildings	36%	36%	28%
Locate new buildings close to the street with parking behind the building	34%	44%	23%
Make sure building fronts are oriented to the street with doors and windows designed to enhance pedestrian experience	45%	46%	9%
Encourage the use of pedestrian-scaled lighting and the installation of pedestrian amenities such as benches where appropriate	71%	24%	5%
Increase the density of new development to make transit service more viable	31%	32%	37%
Encourage mixed-use development that includes residential, retail and offices near one another	37%	40%	23%
Retrofit existing developed areas with a mix of uses. For example, permitting new residential development in retail/office districts or retail development in office districts	41%	40%	19%
Include "traffic calming" elements such as intersection neck downs, bulb outs, and textured crosswalks in street design to slow traffic down	55%	25%	20%
Require sidewalks and bike paths as part of new development	82%	14%	4%
Install sidewalks and bike paths in already developed areas where they are missing	74%	19%	8%
Include bus pull offs and shelters as part of new development	64%	29%	8%
Adjust parking standards to reduce the amount of parking constructed as part of new development	27%	45%	28%
Require property owners and developers to develop trip reduction plans to limit the number of cars entering and exiting their sites during peak commuting hours	28%	34%	41%

Table 6.4: Resident Support for Various Smart Growth Strategies

Similar to the resident survey, study area workers were also asked their opinions relative to smart growth land use strategies. Table 6.5 provides a summary of the worker survey results. Again, there is evidence of significant public support for almost all of the suggested strategies.

Table 6.5:	Worker	Support for	Various	Smart	Growth	Strategies
------------	--------	-------------	---------	-------	--------	------------

Smart Growth Strategy	Strong Support	Support	Do Not Support
Cluster new buildings close together to make it easier to walk between buildings	41%	36%	22%
Locate new buildings close to the street with parking behind the building	46%	36%	18%
Make sure building fronts are oriented to the street with doors and windows designed to enhance pedestrian experience	52%	32%	16%
Encourage the use of pedestrian-scaled lighting and the installation of pedestrian amenities such as benches where appropriate	67%	21%	12%
Increase the density of new development to make transit service more viable	48%	28%	24%
Encourage mixed-use development that includes residential, retail and offices near one another	40%	39%	21%
Retrofit existing developed areas with a mix of uses. For example, permitting new residential development in retail/office districts or retail development in office districts	45%	41%	8%
Include "traffic calming" elements such as intersection neck downs, bulb outs, and textured crosswalks in street design to slow traffic down	48%	27%	25%
Require sidewalks and bike paths as part of new development	66%	22%	13%
Install sidewalks and bike paths in already developed areas where they are missing	68%	20%	12%
Include bus pull offs and shelters as part of new development	62%	24%	14%
Adjust parking standards to reduce the amount of parking constructed as part of new development	28%	41%	31%
Require property owners and developers to develop trip reduction plans to limit the number of cars entering and exiting their sites during peak commuting hours	32%	35%	33%

6.5 Strategies

Transportation-efficient development is defined as "development that supports the use of alternative transportation modes while reducing the need to drive alone."⁷ A recent study conducted for the Washington State Department of Transportation found that local land use regulations were critically important to implementing transportation-efficient development. As described above, Franklin and Piscataway Township plans and zoning regulations are weak relative to the principles of smart growth, especially with regard to linking transportation and land use as part of the community development process. The following strategies should be considered to encourage more transportation-efficient development and promote walking, biking and transit use in the study area:

1. Revise and adopt comprehensive circulation plan elements that fully address all modes of transportation.

As noted earlier, both Franklin and Piscataway Townships include circulation elements within their respective master plans. Unfortunately, the circulation elements are not comprehensive and neither links land use and transportation objectives explicitly with specific implementation strategies designed to achieve the stated objectives. Both communities should reexamine their master plan circulation elements to ensure that all modes of transportation are adequately addressed. This should include:

- a. Rethink master plan goals and objectives and setting specific objectives for each mode of transportation;
- Prepare a comprehensive inventory of existing and planned future transportation resources, including roadways, bicycle facilities, sidewalks, multiuse paths and transit services;
- c. Collect data related to the location of existing and future trip generators, the origins and destinations of local and regional travelers, and the potential impact of "building-out" existing zoning in terms of future travel demand;
- d. Assess existing and future transportation needs for all modes of transportation and for all potential users, including and especially those that cannot or choose not to drive (e.g., children, seniors, and those with limited or no access to personal automobiles);
- e. Integrate the circulation plan element findings and recommendations with other master plan elements and the plans of neighboring jurisdictions, the county, the North Jersey Transportation Planning Authority and various state agencies; and
- f. Define an action plan for addressing the identified transportation needs and achieving the circulation plan goals and objectives. The action plan should identify which specific implementation tools and techniques can and should be used. For example, capital improvement programs, impact fees, developer agreements, zoning changes, design guidelines, access management plans, and site plan review processes.

⁷ Kavage et al., Implementing Transportation-Efficient Development: A Local Overview, University of Washington, June 2002

2. Increase connectivity for all modes within and between existing and future development. Currently, residential neighborhoods and non-residential districts in both Franklin and Piscataway Townships are not well connected. The street layout in both towns follows a typical suburban model of internal circulation roads and driveways connecting to collector roads and then to arterial roads, providing few route choices. This model of circulation funnels vehicular traffic onto a limited number of roads, resulting in recurring congestion in many locations. This model also limits pedestrian and bicycle circulation. Figure 6.2 contrasts this model with a traditional grid pattern that relies on smaller block sizes, multiple connections and provides a variety of route choices for motorists, bicyclists and pedestrians.



Figure 6.2: Traditional grid pattern vs. typical suburban street layout

Franklin and Piscataway Townships should plan and construct new roadway connections between existing arterials to reduce overall block size, reconnect "no outlet" streets and increase route choice for motorists, transit vehicles, bicyclists and pedestrians. Municipal ordinances should be amended to limit future cul-de-sacs and no outlet streets in favor of an interconnected network of streets; establish block-size maximums; and require a continuous network of sidewalks and pathways for pedestrians and bicyclists, including well-designed and maintained cross-walks. Wherever feasible, new pedestrian and bicycle facilities should be constructed to connect existing residential neighborhoods to one another and adjacent commercial districts.

The "super-block" bounded by Easton Avenue, World's Fair Drive, Pierce Street and Davidson Avenue in Franklin Township was chosen to illustrate the application of a number of possible smart growth land use and transportations strategies to the study area. This superblock measures roughly ½ mile by ½ mile, or 0.25 square miles. While the existing auto-oriented landscape and lack of pedestrian infrastructure are not conducive to walking, Figure 6.3 shows how the entire superblock is virtually within a 5-minute walking distance from a central point.

Figures 6.4 illustrates how this superblock could be broken up into smaller blocks by connecting existing driveways, parking lots and internal circulation roads. Such a configuration would enhance access to commercial sites within the district and provide route options for motorists, resulting in less congestion at key locations. Furthermore, because each road would be expected to carry an incrementally lower volume of traffic than existing collector roads and arterials, the streets could

Graphic courtesy of Troy Russ, Glatting Jackson

and should be designed at a neighborhood scale with appropriate facilities for pedestrians and bicyclists and traffic calming.

The "enhanced connectivity plan" identifies 10 locations within the superblock where new roadway connections should be established, between parking lots or between existing driveways and parking lots. Once established, these new connections will begin to provide the superblock with an enhanced level of connectivity, that is, the possibility of multiple routes for each trip, therefore beginning to disperse traffic throughout the system.

One relatively simple connection could be made in the short term by eliminating the cul-de-sac, Napoleon Court, located on the westbound side of World's Fair Drive 1,800 feet west of Easton Avenue. Napoleon Court could be extended along the eastern edge of the Atrium office complex to connect to Atrium Drive. This change appears feasible, since there is virtually no grade change in this area and no physical structure along the proposed right-of-way.



I-287 Mobility Plan

Rutgers- Vorhees Transportation Center



182 Nassau Street, Suite 201 Princeton, New Jersey 08542 Telephone 609 683 3600 Fax 609 683 0054 Internet: www.lrk.com



Figure 6.4: Franklin Township "Superblock" – Enhanced Connectivity Plan I-287 Mobility Plan

Rutgers- Vorhees Transportation Center



182 Nassau Street, Suite 201 Princeton, New Jersey 08542 Telephone 609 683 3600 Fax 609 683 0054 Internet: www.lrk.com

3. Encourage a greater mix of uses in non-residential districts and ensure densities are compatible with transit service.

As noted in the introduction, mixing land uses is one of ten key principles commonly associated with smart growth. According to the EPA's Smart Growth Network, mixed land uses create better places to live; make alternatives to driving, such as walking or biking, viable; provide a more diverse and sizable population and commercial base to support public transit; enhance the vitality and perceived security of an area by increasing the number and attitude of people on the street; and help to revitalize community life.⁸ Uses can be mixed within a single building, on a single parcel and/or within a larger district. Each plays an important role in helping to create a vibrant mixed-use place.

Many planning and land use experts agree that mixed-use development can:

- Create a sense of place and provide opportunities for more interaction among people;
- Increase economic vitality and expand market opportunities;
- Support long-term economic stability by strengthening the tax base, job market, and business opportunities;
- Increase transportation choice by making walking, biking, and transit viable travel options;
- Maximize use of land and public infrastructure (i.e. roads, water, sewer);
- Allow people to use facilities at different times for different purposes; and
- Provide affordable and market-rate housing options.

(Center for Community Economic Development, University of Wisconsin, 2000)

Although the mix of land uses in the study area as a whole includes residential (some moderate density) commercial/retail, office, industrial and other uses, there is very little mixing of land uses within districts. In fact, mixed-use development is not permitted as of right in any district within the study area. As is typical in suburban settings, uses are segregated and connectivity between districts is lacking. Development densities in some areas, most notably in Franklin Township's M1, M2 and C-B districts (FAR=0.4-0.5), and Piscataway Township's R-M district (up to 15 du/acre), are compatible with transit service; however, parking standards and layout, and building setbacks, layout, and orientation are not currently conducive to pedestrian activity and transit use. Franklin and Piscataway Townships should consider amending their municipal ordinances to permit mixed-use buildings and encourage compact mixed-use development in non-residential districts. This could be done in a variety of ways and at several scales:

a. Strategic in-fill of complementary retail/restaurant uses in existing commercial/office districts – Within the study area, existing retail/restaurant locations are located distant from office buildings and area hotels. Small nodes of retail/restaurant/entertainment uses could be added in strategic locations throughout the study area to allow more convenient access by walking or transit. Additional convenience retail could also facilitate the use of commute options by eliminating the need for a car to run midday errands.

Figure 6.5 illustrates how retail/restaurant uses could be located within the existing fabric of a commercial/office district. In this case, the intersection of Pierce Street and Atrium Drive becomes a node of street level activity that begins to give some structure to the emerging hospitality corridor. It is anticipated that complementary uses to hotels -- such as

⁸ Smart Growth Online n.d.

a movie theatre (corner of Pierce and Atrium), cafes, restaurants and retail – could begin to populate this area and transform it into a pedestrian-scale environment, with activities beyond the current 8 to 5 schedule. The potential to share parking between these complementary uses on different schedules is of particular interest.

This example provides for the addition of an 8-screen movie theatre and 68,000 square feet of retail/restaurant/cafes. It also suggests 180 new housing units, including 30 in mixed-use buildings with ground floor retail.

- b. Strategic in-fill of transit-supportive residential uses in existing commercial/office districts Residential uses are not currently permitted within existing commercial/ office districts in the study area. However, there are a number of remaining parcels of undeveloped land interspersed throughout these districts. New moderate to high density housing could be added to these districts to create a better "sense of place," provide an opportunity for some workers to live near jobs, to increase the efficiency of existing transit services and to support new retail and restaurant uses. Figure 6.6 illustrates how new residential uses could be located within the existing fabric of a commercial/ office district. This example provides for the addition of 75 townhouses or 150 apartments.
- c. Redevelopment of existing commercial/office districts The full benefits of mixed-use, transportation-efficient development within the study area may only be realized through more aggressive redevelopment planning. Although much of the land within the study area's existing commercial districts is already developed and "built-out" according to current zoning, it has not been optimally utilized. Existing structures are separated by large areas of surface parking and landscaped areas. Over time these voids could be filled in with new uses and underutilized or functionally obsolete properties could be redeveloped. Figure 6.7 illustrates how a 0.25 square mile commercial district could be retrofitted with a new circulation pattern and new uses to create an integrated, amenity-rich, mixed-use center that provides a community focal point. In this example, a total of 1,100 to 1,500 dwelling units are added to existing office, light industrial and hotel uses along with 155,000 square feet of retail, restaurant, entertainment and small office, and 10,000 square feet of civic/ institutional space.



Figure 6.5: Strategic Infill Development – Retail/Restaurant/Entertainment Uses I-287 Mobility Plan

Rutgers- Vorhees Transportation Center

03.05021.00 • May 19, 2005 © 2005 Looney Ricks Kiss Architects, Inc. All rights reserved.



182 Nassau Street, Suite 201 Princeton, New Jersey 08542 Telephone 609 683 3600 Fax 609 683 0054 Internet: www.lrk.com



Figure 6.6: Strategic Infill Development – Transit-Supportive Residential I-287 Mobility Plan

Rutgers- Vorhees Transportation Center

03.05021.00 • May 19, 2005 © 2005 Looney Ricks Kiss Architects, Inc. All rights reserved.



182 Nassau Street, Suite 201 Princeton, New Jersey 08542 Telephone 609 683 3600 Fax 609 683 0054 Internet: www.lrk.com



Figure 6.7: Full-Scale Redevelopment I-287 Mobility Plan

Rutgers- Vorhees Transportation Center



182 Nassau Street, Suite 201 Princeton, New Jersey 08542 Telephone 609 683 3600 Fax 609 683 0054 Internet: www.lrk.com

When planning for infill and redevelopment special attention should be paid to ensuring that development densities are supportive of increased transit use. Table 6.6 describes the densities necessary to support different types of transit service. These guidelines should be considered as part of the in-fill/ redevelopment planning process.

Residential Use	Commercial Use	Transportation Compatibility
15 to 24+ units/acre	150+ employees/acre	Supports rail or other high capacity service
7+ units/acre	40+ employees/acre	Support local bus service
1-6 units/acre	2+ employees/acre	Supports cars, carpools and vanpools

Source: Planning for Transit-friendly Land Use, NJ TRANSIT June 1994

There are a variety of tools and techniques available to local government to implement mixed-use development. These include:

- As-of-right and conditional use zoning Mixed-use buildings and development can be permitted as-of-right or as a conditional use in one or more specific zoning districts.
- Performance zoning Performance zoning focuses on avoiding, minimizing and mitigating
 potential impacts from development on adjacent uses, neighborhoods and/or the community as
 a whole rather than regulating specific uses. Mixed-use buildings and development would be
 permitted in certain districts provided the development meets specified performance standards
 or criteria related to things such as traffic, light, and noise impacts.
- **Special area plans** Special area plans are comprehensive development plans for a specific geographic location. They are most frequently developed by a municipality or in partnership with one or more property owners as part of a public planning process. Special area plans usually present a clearly defined vision for how a parcel or district should be developed and often include detailed design guidelines to ensure that development occurs in a manner consistent with that vision. Special area plans often provide a community with maximum control over development outcomes but must be flexible enough to respond to economic and market conditions.
- Overlay zoning Overlay zoning, as the name implies, superimposes a new set of development guidelines/regulations on an existing zoning district, part of a district or multiple districts. Typically it is used to achieve a specific planning objective such as protecting a special resource or fostering transit-oriented development. Overlay zones often provide incentives to encourage compliance with zone requirements and/or allow the use of underlying zoning regulations under special conditions such as unique circumstances or hardship.
- Density bonuses Density bonuses are a widely used tool to achieve various planning objectives. For example, density increases are frequently granted as an incentive to: encourage the construction of affordable housing, foster compact development, preserve open space, and/or provide for any number of other public amenities. Density bonuses can also be used to promote mixed-use buildings and development.
- Transfer of development rights (TDR) Transfer of development rights is a realty transfer system where development potential in a specified preservation area can be purchased by

private investors for use in a targeted growth area. In exchange for a cash payment, landowners in the preservation area place a restrictive easement on the property that will maintain the resource into perpetuity. The land in the designated receiving area can then be developed at a higher density than allowed under the baseline zoning. This process reduces the consumption of critical resources while still accommodating growth and eliminates the "windfalls and wipeouts" in property values normally associated with zoning changes.⁹ A TDR program could be used to foster mixed-use development and redevelopment in one or more existing commercial districts without substantially increasing the overall development yield expected from township-wide zoning.

4. Adopt design standards and guidelines to enhance the built environment, promote walking and biking and encourage transit-friendly development.

With or without mixed-use development, a great deal of benefit can be derived from good urban design. Urban design relates the layout and configuration of public and private space. Good urban design helps to achieve important smart growth principles, such as: taking advantage of compact development; creating walkable neighborhoods; and fostering distinctive, attractive communities with a strong sense of place. Toward this end, Franklin and Piscataway Townships should adopt development design standards designed to enhance the built environment, promote walking and biking and encourage transit-friendly land uses. Design standards should do the following:

- a. Require continuous sidewalks both on and off site;
- b. Cluster buildings in nodes, especially around transit stops to encourage walking;
- c. Reduce setbacks and orient building fronts toward public streets;
- d. Require articulation and fenestration of building facades;
- e. Require minimum standards for building transparency on sides fronting public streets;
- f. Locate parking behind buildings in all districts. Make use of parking structures where appropriate; and
- g. Reduce street widths and intersection radii and use traffic calming to slow traffic within districts and enhance pedestrian safety.

5. Revise parking standards to encourage trip reduction and use of alternative modes.

The greatest inducement to drive-alone commuting is ample, convenient, free parking. As previously described, parking regulations in Franklin and Piscataway Townships include few strategies intended to support smart growth principles. Based on a limited field investigation, parking occupancies vary throughout the study area. At some locations, peak parking demand was close to that required by zoning; however, at half of the observed sites, peak parking demand was approximately 50% or less than that required by zoning. Both Townships should:

- a. Consider lowering minimum parking requirements and establishing maximum parking requirements;
- b. Permit and encourage the use of shared parking;
- c. Permit and encourage land banking as an alternative to constructing parking up-front; and

⁹ NJ Office of Smart Growth, 2005

d. Encourage the use of on-street parking and permit an off-set when calculating on-site parking requirements.

6. Consider the creation of "Special Improvement Districts" to encourage business development, support infrastructure enhancements in commercial areas and provide operating support for additional transit services.

A Special (Business) Improvement District (SID) is a public/private partnership designed to address the unique needs and circumstances of a downtown area or commercial district. A SID is an organizational and financing tool used by local businesses in partnership with the municipality to provide specialized services such as sidewalk maintenance, graffiti removal, physical improvements, security, special events and holiday lighting, as well as marketing and business promotion. SIDs are similar to water, sewer or fire districts where property owners pay additional fees for specific services. SIDs enable property owners and business owners to form a local management association with the authority to collect assessments, in turn providing a dependable source of funding for area-wide improvements.¹⁰ Franklin and Piscataway Townships should consider creating one or more Special Improvement Districts to plan, fund and manage needed infrastructure enhancements such as sidewalks, bikeways, streetscape improvements, transit amenities, and additional transit services.

7. Encourage community and stakeholder involvement as part of any smart growth planning initiative.

Any smart growth planning initiative should include numerous and varied opportunities for the public and other stakeholders to provide meaningful input into the planning process. Planning processes should follow the following three principles:

- **Open and transparent** When undertaking any planning initiative, every effort should be made to make the process as open and transparent as feasible. For example, stakeholders potentially affected by the initiative and other members of the interested public should be given advance notice of meetings and a detailed agenda should be provided with the notice to allow members of the public to prepare in advance for the meeting.
- Inclusive Public involvement efforts should be proactive in seeking out potentially affected individuals and groups, including property owners, developers, businesses, citizen groups and neighborhood associations. Every effort should be made to engage these individuals and groups in the planning process. Local stakeholder "buy-in" is often a critical element of success.
- Responsive It is not enough to invite key stakeholders to attend and participate in meetings. To the maximum extent practicable, stakeholder and public input should be recorded and whenever possible, planners and decision-makers should respond to questions and concerns in a timely manner.

Very often, smart growth planning initiatives benefit from non-traditional public involvement strategies and techniques. For example, the national Smart Growth Network advocates the following:

• Seek technical assistance to develop public participation processes;

¹⁰ NJ Department of Community Affairs, 2005

- Use unconventional methods and forums to educate nontraditional, as well as traditional, stakeholders about development and decision-making processes;
- Conduct community visioning exercises to determine how and where the community should grow;
- Work with the media to disseminate planning and development information on a consistent basis;
- Engage children through education and outreach;
- Cultivate relationships with schools, universities and colleges;
- Bring developers and the development community into the visioning process;
- Hold a design charrette to resolve problematic development decisions;
- Use third-party groups to make sure a range of stakeholder views are expressed;
- Use nonprofit groups as smart growth consultants;
- Use "kick-the-tires" field trips to take local government officials and residents to visit smart growth communities;
- Develop community indicators to make sure that development is meeting community goals;
- Illustrate complex concepts with photographs and imagery; and
- Create and distribute free videos to illustrate local planning goals¹¹.

Franklin and Piscataway Townships should adhere to the principles of "smart" public involvement and experiment with non-traditional involvement techniques when seeking to implement the strategies set forth in this plan.

¹¹ Smart Growth Network, Getting to Smart Growth I and II

7.0 PEDESTRIAN AND BICYCLE FACILITIES

7.1 Introduction

Very few persons currently employed within the study area walk or bicycle to work. Since there are roughly 18,600 people who live within five miles of their workplace in the study area, the potential exists for many more people to bicycle to work. The number of people willing to ride their bike will always be inhibited to some degree by the perception that roadways in the study area are dangerous to ride upon, or other factors, such as the need to wear business clothing to work or the greater convenience of driving. However, if the townships take steps to improve bicycle facilities, it may be possible to increase the number of bicycle commuters in the study area.

Because of the distance of the businesses in the study area from residential neighborhoods, it will be difficult to significantly increase the number of people who walk to work in the study area. However, the provision of sidewalks on more roadway links will make it more convenient for people in the study area to use transit services. The provision of sidewalks will also make it more feasible for workers to walk to restaurants or commercial uses in the study area, should these uses ever be introduced as part of a comprehensive smart growth strategy.

The potential of encouraging greater pedestrian and bicycle activity in the study area through better facilities is borne out by the results of the I-287 surveys. In the workers survey, 57 percent said that they would walk more if they had a safe and comfortable environment, while 9 percent said that they would consider bicycling to work if a safe bike network existed. In the residents survey, 76 percent said that they would walk more in a safe and comfortable environment, and 9 percent said they would consider bicycling to work if a safe bike network existed.

7.2 Existing Conditions

7.2.1 Existing Pedestrian Facilities

The study area in both Franklin and Piscataway Townships is characterized by a relative scarcity of sidewalks. An inventory was conducted to determine the presence of sidewalks along key roadways. With few exceptions, the roadways chosen for the inventory are at the level of collector or minor arterial, or roadways that run through major commercial or industrial areas. There are several reasons for this focus. These roadways carry a higher amount of traffic volume, or accommodate vehicles traveling at a higher speed, than lower-level roadways in predominantly residential neighborhoods. The lack of sidewalks along these roadways thus presents a potentially higher danger for pedestrians. Further, these roadways provide access to the vast majority of commercial and industrial uses in the study area.

The results of the inventory are depicted in Figure 7.1, Presence of Sidewalks. As indicated, in Franklin Township, sidewalks are found on both sides of the roadway only on the easternmost section of JFK Boulevard; and on New Brunswick Road, passing through a medium density residential neighborhood. Sidewalks are found on one side of the roadway only on Demott Lane; New Brunswick Road; and Cedar Grove Lane. All of the locations above are proximate to residential neighborhoods. There is a conspicuous absence of sidewalks along all of the roadways proximate to commercial and industrial uses, with the asphalt path on Easton Avenue being the one exception. This path terminates at Cedar Grove Lane. There is also the remnant of a sidewalk on the east side of Easton Avenue (discussed below).



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\Sidewalks_11x17.mxd - 05/25/05

In Piscataway Township, sidewalks are found on both sides of the roadway only on Park Avenue, Plainfield Avenue, and a portion of Morris Avenue next to Suttons Lane. Sidewalks are found on one side of the roadway only on Knightsbridge Road/ Behmer Road; South Randolphville Road; Morris Avenue; Suttons Lane; and a small portion of River Road north of Interchange 9. With the exception of Knightsbridge Road and Randolphville Road, these roadways are predominantly residential.

7.2.2 Existing Bicycle Facilities

Existing bicycle facilities, or bicycle facilities planned to be constructed in the near future, are depicted on Figure 7.2, Existing and Planned Bicycle Facilities. The most prominent bicycle facility in the study area is the Delaware & Raritan Canal (known popularly as the D&R Canal). The Canal extends the entire length of the border between Franklin and Piscataway Townships; continuing west, it runs along the border between South Bound Brook Borough to the south, and Bound Brook Borough and Middlesex Borough to the north. It then borders the western edge of Franklin Township.

In Franklin Township, other bicycle facilities include a multi-use path on Demott Lane starting several hundred feet west of Easton Avenue, and continuing through Amwell Road; a bike path through Centennial Park in the southwest corner of the study area; a newly striped bike lane on Cedar Grove Lane from New Brunswick Road to Easton Avenue; and a bike route along Easton Avenue.

In Piscataway Township, a multi-use path is present the entire length of Johnson Park. A web of bicycle facilities is developing on the Rutgers Busch and Livingston campuses, with, most dramatically, a grade-separated multi-use path extending across River Road in conjunction with the new Route 18 bridge. Multi-use paths are also planned to extend through the Busch campus to Davidson Road, and along Hoes Lane. As part of the Route 18 Extension - Section 3A, a multi-use path will be installed along Hoes Lane from Davidson Road to Behmer Road. A bike lane is striped along Avenue E through the Livingston campus. There are two bicycle routes designated in Piscataway: along Custer Street from Plainfield Avenue to Rivercrest Drive, and along Ethel Road. Finally, new multi-use paths have been installed extending from Deborah Road to the Piscataway Library; and along Sidney Road from the Piscataway municipal offices to the Piscataway High School athletic fields.



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\ExBikeFacs_11x17.mxd - 05/25/05
7.2.3 Easton Avenue

Particular attention was given to Easton Avenue, given this roadway's importance. It should be noted that the existing facilities on Easton Avenue are deficient in several respects. The sidewalk on the east side as originally installed appears to have been only three to three and one-half feet wide, but its effective width today is even narrower, either because sections have crumbled or have been overgrown. Further, the sidewalk is covered in debris: dirt, sand, broken glass, tar paper, and other litter. It has clearly not been maintained in any fashion. At about four feet in width, the asphalt path on the west side of Easton Avenue is inadequate for regular bicyclist usage, and is a substandard facility by NJDOT guidelines. Like the sidewalk on the east side of Easton Avenue, the asphalt path on the west side does not appear to have been swept for a considerable period.

The missing sidewalk sections along Easton Avenue through the interchange area – and the lack of shoulders in the roadway – make travel difficult for all pedestrians and bicyclists, and improvisation is common. The study team observed one young man riding his bicycle east on Cedar Grove Lane to Easton Avenue, and over the grass to the northwest corner of the intersection. He crossed the southbound lanes to the concrete median, hopped onto the median, and rode on it to World's Fair Drive, where he crossed the two northbound lanes, and continued along Easton Avenue to the north.

Although the land uses and roadway access points on Easton Avenue within vicinity of the I-287 interchange are on the west side of Easton Avenue, the only sidewalk along Easton Avenue through the interchange area is on the east side. The sidewalk ends at Davidson Avenue; north of this point, a guardrail runs directly proximate to the curb, so pedestrians must cross back over to the west side if they do not wish to walk in the street.

Unfortunately, there are few good options for ameliorating this situation. A sidewalk on the west side of northbound Easton Avenue would require pedestrians to conduct multiple crossings of ramps at unsignalized locations. The same would be true for a sidewalk installed along southbound Easton Avenue through the interchange area.

7.2.4 Pedestrian and Bicycle Activity

Although the numbers of pedestrians and bicyclists in the study area is relatively small compared to urban areas, there are locations with regular activity. For example, the study team documented several persons who live in the vicinity of Demott Lane and commute via bicycle to the University of Medicine and Dentistry – New Jersey in Piscataway; they access the D&R Canal towpath at Demott Lane, bicycle to Landing Lane, and travel on the Johnson Park bikepath to the Rutgers Busch campus. The study team also documented several service workers who live in Bound Brook and South Bound Brook, and who bicycle to the canal towpath access points in South Bound Brook or north of I-287 in order to travel to workplaces along Easton Avenue. A service worker who lives in a townhouse complex in the vicinity of JFK Boulevard either bicycles or walks to work via Easton Avenue to the Marriott Hotel on Davidson Avenue. In an interview with the study team, he indicated that he considers it dangerous to bicycle along Easton Avenue.

7.2.5 Land Development Ordinances

The land development ordinances for both municipalities currently make little reference to the need to provide pedestrian facilities.

The Site Plan Review chapter in the Franklin Township Land Development Ordinance (112-15) indicates that one purpose of the site plan review is to ensure "safe and efficient vehicular and pedestrian circulation." However, there is no general requirement for the provision of pedestrian facilities. The only place where sidewalks are specifically mandated is the Senior Citizen Village district; Section 112-90 requires that each dwelling shall have immediate access to a sidewalk or bikeway located to the front, side, or rear of the dwellings. (It should also be noted that bikeways are required along main access roadways, with off-site bikeways connecting the SCV to public open space or recreation facilities.)

The Piscataway Site Plan Review Ordinance indicates that the reviewing municipal agency shall consider "pedestrian and vehicular traffic movement within and adjacent to the site," but does not specifically require the installation of sidewalks for new developments. Similar to Franklin Township, Piscataway does require sidewalks in its age-restricted zone, in this case the Senior Citizen Housing District. Sidewalks are also required within the Planned Residential Development district (21-1011).

Based upon the minimal presence of sidewalks in the study area – particularly in the industrial and office areas – both townships have granted numerous waivers to developers from the requirement to address pedestrian circulation needs. (It should be noted, however, that in the past several years, Piscataway Township has typically required applicants before either the Planning Board or the Zoning Board to install sidewalks.) Some developers have presented the argument that there is no point to installing sidewalks, since there are no other sidewalks to connect to. Such an argument may have appeal when isolated lots are originally developed in what is otherwise a rural or low-density suburban area, but loses force when an entire area is developed and different land uses present the opportunity for greater pedestrian activity. With increasing development in the study area; with a more viable opportunity for transit service; and with a greater variety of land uses in proximity, sidewalks become correspondingly more important to accommodate pedestrian activity.

7.2.6 Selection of Roadways for Pedestrian and Bicycle Facilities

The roadways selected for the installation of both pedestrian and bicycle facilities (discussed later in this chapter) were identified for investigation at the beginning of the study, based upon field views conducted of the study area, proximate land uses, existing transit services, and input provided in the focus groups. Subsequent analysis helped identify roadways that should be targeted by either township for the installation of these facilities.

The selection of the roadways was confirmed by the results of the I-287 resident and worker surveys. In the resident surveys, in response to an open-ended question on where sidewalk and bike facilities are needed, some residents identified locations where specifically sidewalks should be installed, while some residents identified locations specifically for bicycle facilities. The large majority identified locations without specifically indicating whether sidewalks or bicycle facilities were desired. Following are the most popular selections from all three groups:

		_ .	Number of
Facility Type	Township	Roadway	Responses
Sidewalks	Franklin Township	Cedar Grove Lane	5
		Demott Lane	4
		Easton Avenue	4
		Amwell Road	3
		New Brunswick Road	3
	Piscataway Township	No location more than once	
Bike Facilities	Franklin Township	Faston Avenue	8
	· · • · · • · · • · · •	New Brunswick Road	4
		Demott Lane	3
	Piscataway Township	River Road	6
Type of Facility not	Franklin Township	Easton Avenue	32
Specified		Amwell Road	26
•		Cedar Grove Lane	26
		Demott Lane	13
		Elizabeth Avenue	10
		New Brunswick Road	9
		JFK Boulevard	6
	Piscataway Township	River Road	11
		Metlars Lane	6
		Centennial Avenue	4
		Hoes Lane	4
	On Township border	Raritan River crossing	4

Table 7.1. Resident Survey Results: Locations where Sidewalks and/or Bike Facilities are Needed

Following are the top choices in the worker surveys for roadways to host sidewalk or bicycle facilities:

Facility Type	Municipality	Roadway	Number of Responses
Type of facility not	Franklin Township	Davidson Avenue	5
specified		Pierce Street	3
		Easton Avenue	2
		Weston Canal Road	2
	Piscataway Township	Centennial Avenue	7
		River Road	6
		Hoes Lane	2

Not surprisingly, the priorities for sidewalk/ bikeway installation in the resident surveys are different than the priorities expressed in the worker surveys. However, a number of roadways in both surveys emerge as clear priorities. In Franklin Township, Easton Avenue, Cedar Grove Lane, Demott Avenue, Amwell Road, Davidson Avenue and Pierce Street are top choices for sidewalk or

_

bike facility installation. In Piscataway, River Road, Centennial Avenue, Metlars Lane and Hoes Lane rank highly.

7.2.7 Delaware-Raritan Canal

The D&R Canal State Park has long been one of central New Jersey's most important historic cultural resources, and the canal path a long-valued recreational resource. It runs along the Raritan River between the borders of Franklin Township and Piscataway Township; between South Bound Brook Borough on the south side of the Raritan River, and Bound Brook and Middlesex Borough on the north side of the River; and finally along the west side of Franklin Township. Within the study area, access points are found at the following locations:

- Landing Lane
- Demott Lane
- North of I-287, opposite the Birchview Apartments

Two access points are also found in South Bound Brook, outside the study area.

The towpath is typically eight feet in width. The surface is made of fine stone, which, while not as advantageous to bicyclists as an asphalt surface, provides adequate integrity for bicycle tires. Perhaps the biggest problem for bicyclists is the presence of the original stone spillways. These spillways were installed at regular intervals along the canal to permit water to flow from the canal to the river whenever water levels became too high. These spillways consist of one to two feet depressions in the towpath, of 100 feet or more in length, covered with stone to prevent erosion. Because the stones are so large – and, in the case of the Landing Lane spillway, slightly tilted – bicyclists must dismount and walk their bicycle to cross them. The surface of the Landing Lane spillways due to their historic nature, but perhaps the stones at Landing Lane could be reset, with some fill, to provide a more stable surface.

No formal studies have been conducted regarding the percentage of bicyclists utilizing the D&R Canal for commuting to work, but it is believed to be small. As discussed above, the study team documented at least several persons who commute to work via the canal. There are a number of reasons for the small numbers of users. Although many New Jerseyans have heard of the D&R Canal, it is likely that a substantial percentage are unfamiliar with the points of access. Signing is non-existent at many access points, including those in the study area. Many of the access points have minimal or no parking, and are in relatively inaccessible locations. The access point to the canal path north of I-287 is an example of the latter issue. As noted, access points within the study area are relatively few. The access locations do not always lend themselves to work trips. While New Jerseyans interested in a long recreational trip may not mind going out of their way to access the canal, the same is not as true of work commuters.

7.3 Strategies

1. Prepare and adopt municipal-wide pedestrian plans.

The most comprehensive strategy available to Franklin Township and Piscataway Township is to prepare a municipal-wide pedestrian plan. Such a plan could build upon the pedestrian facility assessment presented in the I-287 Mobility Plan, most obviously by incorporating the entire municipality, not only the areas within the I-287 study area. The plan should conduct a pedestrian crash history, inventory the presence and condition of all sidewalks in the study area, and determine pedestrian "desire lines" that are currently not being met by existing pedestrian facilities. The plan could also present an action plan for installing sidewalks in priority locations.

2. Amend municipal ordinances to require the installation of sidewalks as part of site plan approval.

The strategy with the largest potential for providing adequate pedestrian facilities in the study area, at the least cost to either municipality, is simply to require applicants for development to install sidewalks as part of site plan approval.

Following is suggested language to insert into the site plan ordinance for both Franklin Township and Piscataway Township. It establishes a clear expectation that sidewalks will be required for all developments, with limited exceptions. Franklin Township – which, unlike Piscataway Township, still has large undeveloped tracts remaining within its borders – may wish to waive the requirement for sidewalks along new homes or non-residential developments in certain zoning districts, in order to preserve its rural character. The final clause in the model ordinance language below would thus apply only to Franklin Township.

It should also be noted that the model language requires sidewalks for remodeling, renovation and expansion projects in addition to new developments. Since the large majority of the study area has already been developed without sidewalks, it will be important to retrofit developments with sidewalks wherever possible.

Sidewalks shall be provided for all of the following types of development:

- New construction;
- Remodeling or renovation (10 percent of the gross floor area or 5,000 square feet, whichever is less);
- Expansion (10 percent of the gross floor area or 5,000 square feet, whichever is less);
- Change in use resulting in an increase in pedestrian traffic.

Sidewalks shall be constructed parallel to a public roadway, within the right-of-way. The reviewing municipal agency may waive the requirement for constructing sidewalks within the right-of-way upon good cause shown by the applicant, including but not limited to the provision of alternative paths not in the right-of-way, where such paths better facilitate the movement of people between the development and adjacent lands.

[Specific to Franklin Township:] Sidewalks will not be required for developments located along local or minor collector roads in the Agricultural, Canal Preservation, or Rural Residential districts.

Landowners should also be required to provide pedestrian connections to adjoining properties wherever feasible. This restriction can be restricted to commercial uses that have at least some potential for pedestrian generation.

3. Install sidewalks along high priority corridors.

Although sidewalks should ideally be installed any place where regular pedestrian activity – even minimal pedestrian activity – is generated in proximity to vehicular traffic, it should be acknowledged that sidewalks are more critical along certain streets than others. Their need is clearly greater along roadways with greater pedestrian activity or the potential for pedestrian activity; higher traffic volumes or speeds; and along local transit routes. Their presence is a key element in whether a development or area can be deemed "transit friendly." If either township is able to secure NJDOT local aid funding for sidewalk improvements, the roadways depicted on Figure 7.3, "Priority Sidewalks" should receive first consideration. As indicated, roadways classified as "primary priority" include Davidson Avenue, World's Fair Drive, Pierce Street and Easton Avenue in Franklin Township, and Centennial Avenue and River Road in Piscataway Township.

A greater number of roadways are identified as secondary priority. In Franklin Township, they include:

- Amwell Road
- Atrium Drive
- Belmont Drive
- Cedar Grove Lane
- Cottontail Lane
- Davidson Avenue
- Elizabeth Avenue
- Landing Lane
- Middlebush Road
- New Brunswick Road
- Pierce Street
- Schoolhouse Road

In Piscataway Township, they include:

- Circle Drive
- Corporate Place
- Custer Street
- Hoes Lane (planned)
- Knightsbridge Road
- Metlars Lane
- New England Avenue
- Old New Brunswick Road
- Possumtown Road
- Randolphville Road
- Washington Avenue



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\SidewalkPriorities_11x17.mxd - 05/24/05

Within the priority sections, the absence of sidewalks is perhaps most keenly felt along Easton Avenue, despite the presence of a multi-use path along a majority of the roadway. This is because Easton Avenue accommodates the heaviest traffic volumes of any roadway in the study area, and, unlike other roadways, does not have shoulders or wide travel lanes in which pedestrians can walk. A sidewalk is particularly needed on the east side of Easton Avenue at JFK Boulevard, since a path in the grass at this location indicates regular activity. A sidewalk is also recommended on Easton Avenue between Cedar Grove Lane and Davidson Avenue. For the latter section, sidewalks are needed on the west side from Cedar Grove Lane to World's Fair Drive; and on the east side, from opposite World's Fair Drive to where the existing sidewalk begins south of the I-287 overpass.

4. Implement pedestrian facility improvements at key intersections and mid-block crossings within the study area.

Although sidewalks are the most important facility needed to improve pedestrian safety and accessibility, other pedestrian facilities in the study area should also be upgraded. Pedestrian signal heads should ultimately be installed at all signalized intersections in the study area; they are currently lacking at many signals. Further, high-visibility crosswalk treatments (such as the "Continental" crosswalk, consisting of evenly spaced white bars) should be considered for major pedestrian crossing locations. The safety of mid-block crossings should always be considered; this has been identified as a particular issue for the roadways adjacent to the Rutgers University campuses.

5. Prepare, adopt and implement comprehensive bikeway plans.

Similar to the first strategy recommended under the Pedestrian section, the most comprehensive strategy available to either municipality for improving bicycle strategies is a bikeway plan. Franklin Township already has a Bikeway Plan, which was approved by that municipality in June 2001. That plan identifies a bikeway network across the entire municipality intended to encourage bicycling for all trips, work in addition to recreation. As such, the implementation of this bikeway network is well suited to the primary goal of the I-287 Plan, which is to increase use of the bicycle for commutation to work.

At the beginning of this study, the study team identified a series of roadways and off-road locations throughout Piscataway to be investigated for incorporation into a bicycle network. During the course of the project, the study team was apprised by Piscataway Township of a bike network that had been identified by the Piscataway Bikeway Commission, and approved by the Piscataway Planning Board. This staging actually proved useful; in many cases, the study team had identified the same roadways as the Township committee, which served to confirm that the roadways chosen were deemed the logical bike routes by local residents and outside consultants alike.

There were some differences between the two networks. The Township Commission had, appropriately, identified roadways throughout the entire municipality, whereas the I-287 study team only identified roadways that fell within study area boundaries. The Township Commission also focused to a greater degree on local residential streets. The bicycle network identified by the I-287 study team has a greater reliance upon county routes and higher-order local roadways, and places a greater emphasis on making as many connections between different routes as possible.

Ultimately, to be successful, a bike network should be directly incorporated into the Circulation Element in the Piscataway Township Master Plan. The Plan should also identify opportunities for implementation in the future.

The roadways identified within Piscataway Township for the I-287 Plan combine the results of the investigation for a potential bike network by the I-287 study team, and the most promising roadways (for work commutation) identified as part of the Piscataway Bikeway Commission effort.

Figure 7.4, Potential Bike Network, depicts the recommended bicycle network for the I-287 study area for both municipalities. The roadways identified within Franklin Township are all derived from the 2001 Bikeway Plan. Franklin Township has begun to implement the recommendations of this Plan, most recently through striping bike lanes along Cedar Grove Lane.

Following is a description of the bikeway types recommended for the key roadways and off-road locations in Piscataway Township (a full description of the bikeway routes for Franklin Township can be found within their Bikeway Plan):

a. **Multi-Use Path** – this facility should have a minimum width of 8 to 10 feet, although a width of 12 feet is recommended for greater capacity and safety. Proper signage should be installed at all areas of potential conflict, such as intersecting streets and driveways. Because such paths are inevitably used by pedestrians and joggers in addition to cyclists, the term multi-use path is preferred over bicycle path.

Multi-use paths are recommended at three locations:

- *River Road.* Middlesex County has proposed extending to Centennial Avenue the multi-use path that runs through Johnson Park and terminates at Hoes Lane. It would run between River Road and the Raritan River. The presence of County-owned property along much of the prospective route makes this a feasible alternative.
- **Ambrose Brook**. As part of a greenway concept, a multi-use path could be extended along Ambrose Brook from Hoes Lane to South Randolphville Road in the vicinity of the Seventh Day Adventist School.
- **Hoes Lane**. As part of the Route 18 extension project along Hoes Lane, NJDOT is proposing multi-use paths along alternating sides of Hoes Lane, west from the Rutgers campus to Behmer Road. Because of the high-volume driveways and roadways that intersect with this multi-use path, it is strongly advised to install signage warning exiting motorists of the presence of bicyclists, and alerting cyclists to high use driveways.



S:\Project_Files\2004183 - I287 Mobility Plan\GIS\Projects\PropBikeNetwork_11x17.mxd - 05/24/05

- b. **Bike Lanes.** These are designated for exclusive use by bicyclists through the use of signage and pavement markings. These should be designated one-way in each direction, to discourage cyclists from riding the wrong way. The bike lane should be five feet in width at a minimum, but six foot lanes are preferable for roadways with heavier volumes or higher speeds. Bike lanes are recommended in the following locations:
 - *River Road.* Bike lanes will not be as critical to install along River Road south of Centennial Avenue, if the Johnson Park bikeway is extended; however, there is some potential for installing bike lanes in this area. Between Centennial Avenue and Hoes Lane West, the cartway width of River Road varies from 40 to 45 feet. Even at the narrowest width, 6 foot bike lanes could be installed if River Road varies from 35 feet to 55 feet in width. Bike lanes could also easily be installed on this section.
 - **Centennial Avenue**. Except at a number of intersections, where shoulders are dropped to accommodate turn lanes, 8 foot shoulders traverse the length of the roadway. These could easily accommodate bike lanes.
 - *Knightsbridge Road-Behmer Road*. These two roadways are treated together since they are directly connected. The roadway width for Knightsbridge Road is 39 feet outside of intersections, and thus could easily be restriped. Behmer Road is 35 feet wide adjacent to the high school, although it does narrow approaching Randolphville Road.
 - **Old New Brunswick Road**. At a cartway width of 40 feet both north and south of I-287, bike lanes could be installed.
 - *Morris Avenue.* Bike lanes would be particularly easy to install here. Seven and eight foot shoulders are already striped for the length of this roadway; all that is needed are bike lane signs and bike stencils.
 - *Ethel Road.* This road is already signed as a bike route, and has six foot shoulders. Bike stencils should be installed along with bike lane signs.
- c. **Compatible Shoulder.** A smooth shoulder should be provided wherever possible along roadways designated as a bike route, even if a five foot bike lane is not quite possible, or if bike lane designation is not viewed as critical. These roadways include:
 - **Metlars Lane.** The width of this roadway varies greatly. Five foot shoulders are present in sections; these should continue to be maintained. The roadway narrows east of Washington Avenue; bike-compatible shoulders should be installed in this section in the future, if possible, as part of any physical roadway improvements.
 - *Washington Avenue*. The width of this roadway will permit the installation of compatible shoulders.
 - **Suttons Lane**. The width of this roadway varies from 36 to 40 feet, permitting the installation of bike compatible shoulders.
- d. **Shared Roadway.** These are roadways which do not currently have, and will likely never have, a cartway width sufficient to accommodate bike lanes or bike-compatible shoulders. Along these roadways, a travel lane of at least 14 feet is recommended to permit shared

use by vehicles and bicycles. Even where this width is not possible, however, lower traffic volumes or speeds permit these roadways to be comfortably used by bicyclists.

- **South Randolphville Road**. The width of this road varies significantly, from 22 feet to 46 feet. This roadway could be a valuable north-south bicycle route, particularly if no multi-use path is ever developed along the Ambrose Brook. The width of the travel lanes, in both northbound and southbound directions, varies from 14 to 20 feet. The travel lanes are wider adjacent to newer residential developments, likely because the developers were requested to improve the roadway as part of site plan approval. The Township should continue to widen this roadway where possible to provide a more comfortable bicycling environment.
- Plainfield Avenue. This roadway is 30 feet wide, with two 15 foot lanes, and thus
 is suitable for shared use. A four foot sidewalk connects Plainfield Avenue to
 Knightsbridge Road. If widened, this connection could serve bicyclists who wish to
 travel from River Road to the Knightsbridge/ Hoes Lane office area, but who wish
 to avoid riding on Centennial Avenue.
- **Park Avenue**. This roadway is 30 feet wide, with two 15 foot lanes. Parking is permitted along this roadway, but only during certain hours, and this roadway could typically be comfortably used by cyclists.
- Lakeway-Sylvan Avenue-Woodland Road-Suttie Avenue-Seward Avenue-Holly Lane. These roadways, which run through a residential neighborhood in the proximity of Nelson Lake, were identified by the Piscataway Bike Commission as a potential bike route. Although none of these roadways comply with NJDOT bike compatible standards, the relatively low traffic volumes and speeds on these roadways make these suitable for use as shared roadways. Because this route is somewhat circuitous, appropriate signing will be important.

It will be important for Piscataway Township to emphasize bicycle facility connections to the Rutgers campuses, given the large number of existing and potential bicyclists in the college area.

6. Promote bicycling through distribution of bikeway maps.

Both municipalities should promote bicycling by distributing bike network and D&R Canal maps through as many venues as possible: major retail centers, government facilities, libraries, community centers, and others. Both townships should also coordinate with area TMA's on marketing bike routes, as well as sponsor annual bicycling events.

7. Ensure that study area sidewalks and bicycle facilities provide connections to areas outside the study area.

Although the I-287 Plan makes recommendations for pedestrian and bicycle facilities only within the study area, facilities on study area roadways should be extended to roadways outside the study area wherever possible. For example, the entirety of Middlebush Road in Franklin Township, virtually all of which lies south of the study area boundary, should ultimately be widened to accommodate shoulders for bicyclists. This roadway was identified as a high priority for pedestrian and bicycle facilities in the I-287 survey. Given the large numbers of persons who live in new residential communities in southern Franklin Township or South Brunswick and commute north to jobs within the study area, bicycle facilities on this roadway would be ideal. Sidewalks would also be desirable, although this is not as high a priority. Similarly, a safe bicycling link needs to be

provided between Piscataway and Middlesex Borough and Bound Brook Borough, given the narrow railroad underpass on River Road. By the same token, connections should be made between the study area and adjoining communities on many other roads.

8. Improve access to the Delaware & Raritan Canal.

Signage should be improved for the canal access areas, to improve awareness. Existing canal



This access to the D&R Canal off Easton Avenue is not signed.

access areas should be improved, and more canal access points should be developed. Canal advocates are exploring the potential for new canal access points. For example, the D&R Canal Commission has expressed interest in a new canal access point north of the diner at the intersection of JFK Boulevard and Easton Avenue, on Block 259 Lot 76. An access point here would be appropriate, given the presence of a traffic signal at this location, and a multi-use path along JFK Boulevard. It should be noted, however, that an access point in this

location would do less to remove vehicular work commuters from the I-287 Raritan River crossings than an access point closer to the I-287 bridge.

It should also be noted that the D&R Canal towpath is recommended to be part of the East Coast Greenway. The Greenway is a proposed 2,600 mile long bike trail to traverse the East Coast from Maine to Florida. When completed, it will heighten the visibility of bicycle and pedestrian facilities in the municipalities through which it passes.

9. Consider new bicycle-pedestrian bridge crossing of the Raritan River and D&R Canal.

The most ambitious means of encouraging regional bicycle trips would be through constructing a bridge across the Raritan River for pedestrian and bicycle travel only. It should first be acknowledged that such a bridge would likely not be justified on the basis of the I-287 Mobility Plan alone. The relatively high cost of such a structure would have more potential to attract funding if promoted as part of an effort to improve bicycle/pedestrian mobility (including trips for recreational purposes) throughout the region.

Currently, there are two river crossings on either end of the study area that could be used by pedestrians or bicyclists. On Main Street between Bound Brook Borough and South Bound Brook Borough, both the river bridge and the canal bridge have pedestrian walkways of about five feet in width. The surface is a steel deck, similar to the surface of the vehicular lanes. Five miles to the south, pedestrian walkways of five feet in width are also present on the Landing Lane river bridge and canal bridge. Landing Lane was cited as presenting a problem for pedestrians and bicyclists by a number of I-287 survey respondents since it lacks a sidewalk from Easton Avenue to the canal bridge and access point.

A number of potential river crossings were identified by the I-287 study focus groups for investigation. Following is a description of each location, along with potential design considerations:

- a. Option 1 South Bound Brook to Middlesex Borough there are two abandoned railroad bridges at this site, one over the Raritan River and one over the canal. The piers and girders of both bridges are still sound, and the only construction needed would be install new decking and rails/fence on both. It is thus likely that this would cost less than any other river crossing. One downside is the close proximity to the existing Main Street bridge. A conversion of the railroad bridges into pedestrian/ bicycle bridges would likely draw pedestrians and bicyclists that currently use the Main Street bridge, rather than serving a new population located at a greater distance from a safe river crossing. From the perspective of this study, a river crossing here would be less valuable than a crossing in closer proximity to I-287, which would be better located to serve residents and workers in Franklin Township and Piscataway Township. It should also be noted that the area on the eastern terminus of the railroad bridge both east and west of River Road is under environmental investigation by NJDEP. A chemical company has been the historic occupant of the lands.
- b. Option 2 Birchview Gardens to D&R Canal Access three potential crossing points were actually investigated in this area: next to the tennis court at Birchview Gardens; on the Birchview Gardens southern property line, opposite the D&R Canal lock; and cantilevered from the existing I-287 bridge.

The site next to the tennis court was dismissed, due to the presence of a petroleum pipeline. It would be difficult to provide adequate room for a structure on the east bank of the Raritan River out of the floodplain.

The more promising location is on the site of an old bridge on the property line between the Birchview Gardens and the River Road Park. The remnants of the old bridge abutments are present on both sides of the river. Because the earth is built up in this location, it will be easier to site a new bridge. Further, there is already an access point to the D&R Canal. A bridge here would also provide access to the major office and industrial corridors in both Franklin Township and Piscataway Township. In that sense, it would probably be more helpful than any other river crossing site in attracting work commuters who would otherwise drive to work via the I-287 interchange area.

Perhaps the greatest drawback is the problem with access. As discussed earlier, facilities are poor for both bicyclists and pedestrians along Easton Avenue. Because of the right-of-way constraints, it will not be possible to greatly widen the existing sidewalk on the east side of Easton Avenue, and to provide a buffer from the vehicular traffic. It may be possible to widen the existing sidewalk by several feet, to achieve a total width of six feet. This could be used to provide access for both bicycle and pedestrian traffic in both directions. It should be acknowledged that such a multi-use path falls short of NJDOT standards in at least two respects: it will be difficult to achieve a minimum width of 8 feet, and a two-way facility directly adjacent to a street is normally not recommended. However, absent a major reconstruction of the entire interchange area, there is simply no viable alternative to improve pedestrian and bicycle access.

The possibility of hanging a pedestrian/bicycle bridge from the existing I-287 bridge was also investigated, but dismissed from serious consideration. Access by pedestrians and

bicyclists would be even more problematic than at the existing D&R Canal access. Further, while the structure would not require the construction of piers as would be the case with a conventional bridge, it would be much longer than the latter, thus negating much of the advantage in cost that might otherwise be anticipated. Finally, if any structural work was done on the I-287 vehicular bridge in the future, the pedestrian and bicycle bridge attachment could be jeopardized.

- c. Option 3 Cedar Grove Lane to Centennial Avenue based on field investigation, this should not be considered one of the top sites. The steep bank on the east side of Easton Avenue at Cedar Grove Lane would significantly complicate access to a pedestrian bridge. There is virtually no level area between the northbound curb and the top of the embankment. A stairway has been installed just to provide access to the small utility structure immediately on the east side of Easton Avenue at this location. The site topography would also serve to increase the cost. Further, both a canal bridge and river bridge would be required.
- d. Option 4 Duke Energy Easement this was dismissed from serious consideration. This natural gas line easement has been integrated into private lots on both sides of the river. The presence of a natural gas pipeline would complicate construction of a bridge on the same site. Since the easement is not present at a signalized intersection, and there is no sidewalk or path along the north side of Easton Avenue, access is not ideal. Further, both a canal and river bridge would be required.
- e. Option 5 Demott Lane and Park Avenue this site offers the greatest proximity to residential areas in both townships. Because the intersection of Demott Lane and Easton Avenue is signalized, Easton Avenue can be crossed in a safe manner. Since there is already canal access at this site, a link between the proposed pedestrian/ bicycle bridge and the D&R towpath is assured. It would also tie together proposed bicycle facilities on either side of the river. On the Franklin side, Demott Lane is proposed by the Franklin Township Bikeway Plan to be widened and to accommodate bike lanes; on the Piscataway side, Park Avenue is proposed to be designated as a bicycle route by the I-287 Plan. On the other hand, a river crossing on this site would likely not attract as many work trips as a pedestrian/bicycle bridge in closer proximity to I-287.
- f. Option 6 JFK Boulevard this site was considered for a river bridge because of the proposal by the D&R Canal Commission to provide a canal access point (and thereby construct a canal bridge) here. If the canal bridge is constructed, it would make a river bridge more feasible. Since the intersection of JFK and Easton Avenue is signalized, cyclists and pedestrians can cross Easton Avenue safely. There is also a multi-use path along JFK Boulevard. However, because of the relatively close proximity to Landing Lane bridge which already has bridges over the river and canal and the distance from I-287, the location is less desirable than several other sites.

In summary: from the perspective of both the study's goals and practicality, the best sites would be at Birchview Gardens and Demott Lane-Park Avenue. Significant site access issues should be addressed for the Birchview Gardens location, however.

Table 7.3 summarizes advantages, disadvantages, length of the river at each site, and an order of magnitude cost estimate to construct the bridge over the river, and, where necessary, over the canal. The cost estimate assumes a simple pre-fabricated bridge, not a "signature" bridge. It assumes only the cost of installing the bridge itself, not installing the path to the bridge or readying the landing area.

Location	Advantages	Disadvantages	Dimensions	Cost
S. Bound Brook	Lower cost, since only redecking of existing bridges is required. Proximity to population center.	Distance from I-287 and from study area. Close proximity to Main St. bridge. Presence of hazardous waste site	Existing river bridge – 512 ft. Existing canal	River bridge redecking - \$375,000 Canal bridge
		al eastern terminus.	bhage – 140 ft.	\$80.000
Birchview Gardens	Proximity to office-industrial corridors in Franklin and Piscataway. Presence of abutments. Presence of canal bridge.	Poor conditions at D&R Canal access point.	River width – ca. 260 ft.	River bridge – \$850,000
Cedar Grove Lane- Centennial Ave	Proximity to office-industrial corridors in Franklin and Piscataway	Lack of canal bridge. Difficult site access at Cedar Grove Lane.	River width – ca. 200 ft.	River bridge - \$725,000
	Signalized intersections at Cedar Grove Lane and at Centennial Avenue		Canal width – ca. 80 ft.	Canal bridge - \$115,000
Demott Lane – Park Avenue	Access to residential neighborhoods. Presence of canal bridge. Signalized intersection at Demott Lane.	Distance from office-industrial corridors in Franklin and Piscataway.	River width – ca. 260 ft.	River bridge - \$850,000
JFK Boulevard	Potential presence of canal bridge. Signalized intersection at JFK Blvd.	Close proximity to Landing Lane bridge	River width – ca. 350 ft. Canal width – ca. 70 ft.	River bridge - \$1,100,000 Canal bridge - \$100,000

Table 7.3.	Comparison	of Potential	River Crossings
------------	------------	--------------	------------------------

10. Extend the Johnson Park Bikeway.

Middlesex County is proposing a bikeway to extend from Hoes Lane to NJ Route 28 in Middlesex Borough, and to the train station in Bound Brook Borough. Alternate Route 1 would be located primarily within Middlesex County parklands along the Raritan River, with some sections on River Road. Alternate Route 2 would be located along River Road in Piscataway Township and Middlesex Borough, and on Lincoln Boulevard and Raritan Avenue in Middlesex. Either route would promote the goal of improved bicycle mobility in the study area.

11. Use innovative mechanisms to fund construction of sidewalk and bicycle improvements.

Both townships should also consider innovative ways of extending public funding, or encouraging private installation, of sidewalks. The townships can offer matching grants to businesses or institutions willing to install sidewalks. It is common practice in many municipalities across the country for the government to share the cost of repairing existing sidewalks, or of installing missing sidewalk segments, with property owners; splits of 50-50, or 60-40 (with 60% being the municipal share) are common. Somerville Borough has a joint sidewalk replacement program which can serve as a model for Franklin and Piscataway Townships. It is less common to share the costs of installing new sidewalks for significant roadway sections, but this should be considered. Some

municipalities require property owners to install sidewalks along key segments of roadways, even in the absence of new development or renovation. The townships should consider coordinating with area TMA's to conduct regular sidewalk inspections.

The townships can also reduce the cost of sidewalk construction by pooling separate projects into one contract. Given the greater efficiencies of scale available, contractors will bid a lower cost to construct a pool of individual projects, rather than sidewalks at only one site.

12. Prepare and adopt maintenance plans for pedestrian and bicycle facilities.

Based upon the appearance of multi-use paths and sidewalks during field views, regular maintenance activities, including sweeping and plowing, are not scheduled. The sidewalk on the east side of Easton Avenue in the I-287 interchange area, and the multi-use path on the west side of Easton Avenue in the vicinity of Cedar Grove Lane, are in particularly poor condition. Both townships should prepare maintenance plans to keep multi-use paths and bike lanes free of debris



The sidewalk along the east side of Easton Avenue is covered with gravel and other debris.

- and in the winter, snow - to the greatest degree feasible. Many leading programs across the country plow paths after a snowfall. The plan should indicate a desirable schedule for all responsible parties. At a minimum, multi-use paths and sidewalks should be swept once a year, at the end of the winter. Bike lanes or compatible shoulders should be swept and plowed along with the vehicular travelway on a regular basis. Debris has been noted in the presence of bike lanes in the study area. Maintenance activities should take

place with greater frequency for locations where multi-use paths run under trees, and thus accumulate twigs.

There can be confusion occasionally regarding multi-use paths separated from a roadway right-ofway; unless they are dedicated to the Township, they are the property owner's responsibility and should be treated as such. If certain facilities are not cleaned on a regular basis, the township should investigate whether bike organizations in the town would be willing to "adopt" a segment of a path for routine maintenance.

8.0 WAYFINDING SIGNAGE

8.1 Introduction

A principal goal of roadway signage is to provide clear direction to motorists who are unfamiliar with an area. "Wayfinder" signs direct motorists from one place to another without confusion. Several criteria should be considered for any wayfinding signage program: the signage should direct motorists to their destination using appropriate roadways (higher level roadways where possible), in the most efficient manner, with the least confusion for motorists, following the safest route. If there is a conflict between the most expedient route and the safest route, the safest route should prevail.

Improvements in signage were recommended as part of the I-287 Interchanges Planning Study. In particular, the study recommended adding signage along I-287 and in Franklin Township to improve traveler information, and to help distribute traffic between the interchanges at Easton Avenue and Weston Canal Road.

Signage along River Road, and in Piscataway Township in general, was not viewed as a significant issue. In large part, this is likely due to the fact that the interchange of I-287 with River Road is much simpler than the I-287 interchange at Easton Avenue. The former is a modified clover-leaf design; the latter is colloquially known as a "spaghetti" style interchange.

8.2 Existing Conditions

8.2.1 Crash Analysis

Several of the highest crash concentrations identified in the original I-287 Interchanges Planning Study are found within the Interchange 10 area. From 1997 to 1999, there were 41 crashes at the intersection of southbound Easton Avenue and southbound I-287 exit ramp, the second highest crash cluster in the study area. The other intersection in the Interchange 10 area to be flagged for a high number of crashes was at the intersection of northbound Easton Avenue and northbound I-287 exit ramp, with 31 crashes. These two locations were second and third, respectively, among all intersections in Franklin Township reviewed.

Not surprisingly, the interchange area also accounted for the highest number of mid-block crash clusters in the study area. The highest cluster was on northbound Easton Avenue between the northern split and Davidson Avenue, with 45 crashes. Second was Easton Avenue between the southern split and World's Fair Drive, with 40 crashes.

In Piscataway Township, the highest intersection crash cluster was at the intersection of I-287 southbound exit ramp and River Road, with 33 crashes. The intersection of River Road and northbound I-287 had 21 crashes.

Of course, there are many causes for the crashes that occur in these areas. But it can be assumed that the factors which lead to crashes at these locations – a high number of vehicles converging and diverging within relatively short segments, on curved ramps and local roadways – would also lead to confusing conditions for motorists.

8.2.2 Signage

There are two types of signs of interest to the I-287 Mobility Plan:

- Logo signs these are the signs showing the "logos" of businesses which would be of interest to regional motorists. These are found only on the interstate roadway system, or on key limited access state roadways. The businesses pay an annual fee to a private company, New Jersey Logos, to install and maintain the signs. Following guidelines established in the Manual on Uniform Traffic Control Devices (MUTCD), businesses can request to have logo signs (referred to as Specific Service signs in the MUTCD) installed if they are located within three miles of an interstate highway interchange, and meet other federal and state criteria. As stated in the MUTCD, the use of Specific Service signs should be limited to areas primarily rural in character or to areas where adequate sign spacing can be maintained. Since the study area is clearly not rural in character, adequate sign spacing is paramount. All businesses are entitled to two signs: one sign is installed on the highway mainline, and a subsequent sign, with direction and distance, is installed on the exit ramp. In cases where the motorist will be required to turn off the road into which the highway exit ramp feeds, businesses may be entitled to a third sign. This sign, referred to as a "Trailblazer" sign, is installed on the local road.
- Guide signs these are the green signs installed by a governmental agency to provide direction to places, roadways, or places of interest to regional motorists. In physically restricted areas, with limited room for sign installation, these take precedence over Logo signs.

The single greatest concentration of signs in the Interchange 10 area is found on the I-287 southbound exit ramp to Easton Avenue, where there are 12 logo, guide, and regulatory signs located within an 1100 feet span. However, the signs here at least have the virtue of regular spacing and consistent sizes and heights; on Easton Avenue itself, there is a greater variety of sign styles and postings.

8.2.4 Franklin Township

In Franklin Township on southbound I-287 just north of Interchange 10, there are three logo sign boards:

- One board with six hotel logos (Doubletree Hotel, Hampton Inn, Courtyard by Marriott, Holiday Inn, Quality Inn, Clarion Suites).
- One board with six food logos.
- One board with one gasoline logo.

Per the standard signing convention of the Logo program, these signs are repeated on the southbound exit ramp. Trailblazer signs for the hotels are also employed on Easton Avenue. Additional signs have been installed for the Doubletree Hotel and Holiday Inn on the southbound exit ramp, accompanied by a left-turn arrow, 200 feet west of the left-turn slot on southbound Easton Avenue. The number of signs for Doubletree and Holiday Inn – at four each – thus exceed the standard maximum of three signs installed as part of the Logo program.

It should also be noted that a number of business signs have been installed on Easton Avenue, apparently without authorization.

8.3 Strategies

1. Revise signage for I-287 southbound motorists exiting in Franklin Township.

A goal of the wayfinding signage recommendations below is to remove as much traffic as possible from the left-turn slot on southbound Easton Avenue. This is consistent with the I-287 Interchanges Planning Study, which called for the left-turn slot to be eliminated as a short/ mid-term improvement. Motorists that use this slot to access Davidson Avenue or Atrium Drive must engage in a series of maneuvers that could contribute to the high crash rate in this area. Exiting I-287 southbound, a motorist must cross two lanes to the left to access the left-turn slot. From this slot, a motorist would turn left onto northbound Easton Avenue, cross one lane to the right to remain through on Easton Avenue northbound through the interchange area, and finally turn left onto Davidson Avenue.

It is therefore recommended that in the future, all motorists southbound on I-287 heading to destinations on Davidson Avenue or Atrium Drive be directed to continue southbound on Easton Avenue, and to turn right onto World's Fair Drive.

This would require changing the signs currently installed on the southbound exit ramp for Atrium Drive and Davidson Avenue, as well as all the logo signs. Motorists destined for Atrium Drive and Davidson Avenue should be signed to keep right. The sign board on the I-287 southbound exit ramp with logo signs for all hotels should be altered, to direct all motorists to the right. The logo signs for Doubletree Hotel and Holiday Inn on the southbound exit ramp, accompanied by a leftturn arrow, can be removed. A logo trailblazer sign for all six hotels can be installed on southbound Easton Avenue before World's Fair Drive.

Until such time that the left-turn slot is removed from Easton Avenue, its function must still be signed in some manner. Therefore, the sign that currently reads "527 North, Davidson Avenue, Garden State Exhibit Center Next Left" should be altered to read "527 North, South Bound Brook Next Left."





Currently, there is no sign on the southbound exit ramp notifying motorists destined for New Brunswick to bear Legends for the two signs above will need to be changed.

right. A sign should therefore be installed on the right side of the exit ramp reading "527 South, New Brunswick." This can accompany the existing "New Brunswick Theater District/ Cancer Institute of New Jersey" sign.

To reinforce the major types of destinations for visitors to this exit, the final sign on the exit ramp can read:

"Garden State Exhibit Center Franklin Township Hotel District Keep Right"

Changes in logo sign placement and guide sign placement on Easton Avenue will be needed in coordination with this recommended change in signing. This will require coordination with both NJ Logos, Inc. and the NJDOT Bureau of Outdoor Advertising. Since visitors will be taking a somewhat less direct route to the hotels under this signing plan, the Township may wish to install wayfinding signage to the hotels both on World's Fair Drive and on Pierce Street. This signage would not have the same appearance as the logo signs, but would simply list the names of the businesses. Signage will also be needed to direct visitors to the Garden State Exhibit Center.

2. Install signing to direct Franklin Township hotel district visitors to I-287.

Consonant with this change, it will be necessary to direct visitors to the "hotel district" back to I-287, since their return route will be different than their arrival route. Signs should thus be posted for eastbound motorists at the end of Davidson Avenue notifying them to turn right to access I-287.



The assembly of signs along Easton Avenue should be reorganized, and unauthorized signs removed.

3. Remove unauthorized signage from Easton Avenue.

To help reduce visual clutter, and focus motorist attention on more critical signage, all signs posted by private parties along Easton Avenue should be removed. Such examples currently include "McAteers," "Candlewood," and "Holy Trinity" (visual clutter aside, non-regulatory signs should never be posted on the same post as regulatory signs, as is currently the case with the Holy Trinity sign). There are also several smaller advertising signs at the base of the signal pole on the southwest corner, and signs advertising "Signs Like This," and "Enterprise" on northbound Easton Avenue.

4. Revise signing for hotels in Piscataway Township.

Logo signs for the Embassy Suites and the Radisson Hotel for Exit 9 are currently posted on I-287 northbound 2100 feet before River Road and on the I-287 northbound exit ramp at River Road. These signs should be removed; new signs should be installed before Exit 8, directing northbound motorists to access these hotels using Exit 8. These trips can be removed from Interchange 9 at no inconvenience to the motorists. Indeed, since their trip is shortened by some 1,700 feet, they will likely reach their destination faster even though the speed limit on Centennial Avenue, at 40 mph, is obviously less than I-287 posted speeds. Motorists exiting I-287 at Interchange 8 access Possumtown Road via a right turn, followed by another right turn onto Centennial Avenue, concluding with a right turn into Kingsbridge Road or the signalized entrance to Embassy Suites. Motorists exiting at Interchange 9, on the other hand, must execute a left turn onto River Road,

followed by navigation of the jughandle to Centennial Avenue, concluding with a left turn at the signalized entrance.

It should be noted that logo signs for Embassy Suites and the Radisson Hotel are also posted southbound on I-287 in Franklin Township, immediately after the southbound exit ramp for Interchange 10. They are also posted on the I-287 southbound exit ramp. Both sets of these signs can remain.

5. Revise signing for truck weigh station on northbound I-287.

A truck weigh station is present along I-287 northbound halfway between Interchange 8 and Interchange 9. The sign indicating the weigh station status – open or closed – is posted immediately before the northbound exit ramp. Because there is not an advance posting on whether the station is open or closed, northbound truckers move to the right lane in order to be ready to access the station. If closed, the truckers must then move back to the middle lane to avoid the queuing behavior frequently found at Interchange 9. MUTCD recommends an "OPEN" or "CLOSED" sign either at the exit ramp for weigh stations, or one mile in advance. Given the congested conditions typically found here, it would be preferable to install a sign one mile in advance, in addition to the weigh station itself.

8.4 Additional Signing Evaluation

It should be noted that both in the focus groups and in the I-287 surveys, questions were posed as to whether wayfinding signage should be installed for additional attractions or districts not currently signed. There was no strong interest or consensus on signing additional land uses.

A number of the hotels located in Franklin Township have expressed an interest in securing placement of logo signs on northbound I-287 coming into the study area. Based upon the physical constraints of the area, including the proximity of other large guide signs, it will be difficult to receive approval for such signs. The MUTCD states that Specific Service signs shall be installed between the interchange of interest and the previous interchange, and at least 800 feet in advance of the Exit Direction sign (Section 2F.06). It is also desirable, if not mandatory, to maintain an 800 feet distance from other signs.

Any sign for Franklin hotels must therefore be installed between the exit ramp for Interchange 9 and the exit ramp for Interchange 10. This spans a distance of roughly 2,700 feet. There are four existing major guide signs along I-287 northbound in this distance, with even spacing between three of the signs. It is not possible to provide the required 800 foot clearance.

9.0 INTELLIGENT TRANSPORTATION SYSTEMS

9.1 Introduction

Simply defined, Intelligent Transportation Systems (ITS) have the goal of applying modern information technology and communication systems to the transportation system to make it more effective, more efficient, and safer. There are many types of ITS applications, but only a few were identified by the study team as having potential for the study area. A description of the applicable systems follows (the classifications and definitions are provided by the FHWA ITS Joint Program Office):

- Arterial Management these systems manage traffic along arterial roadways, employing traffic detectors and traffic signals. The primary goal is to improve traffic flow and safety.
- Incident Management these systems reduce the effects of incident-related congestion by decreasing the time to detect incidents, time for responding vehicles to arrive, and time required for travel to return to normal conditions.
- **Traveler Information** these applications use a variety of technologies, including Internet websites, telephone hotlines, as well as television and radio to allow users to make more informed decisions regarding trip departures, routes, and mode of travel.

For any ITS system, fundamental questions must be answered:

- What data will be collected?
- How will the data be collected, and by whom?
- How will the data be compiled and disseminated, and by whom?
- Who is the intended audience?

Because there are relatively few signalized intersections in the study area, arterial management may have less potential for use in the I-287 study area than incident management and traveler information. However, all three ITS systems are discussed in this element. The analysis of the different systems is preceded by a discussion of data collection. Proper data collection and management is integral to the success of most ITS applications.

9.2 Existing Conditions

9.2.1 Organizations

There are currently no ITS applications within the study area. However, there are increasing examples of ITS systems in the New York-New Jersey metropolitan area that can ultimately be applied within the study area. Two entities are pivotal to existing ITS applications in the metropolitan area, and will be instrumental in potential ITS applications in the study area. These are:

 New Jersey Department of Transportation Traffic Operations Center (TOC) North – NJDOT has two high-tech Traffic Operations Centers (TOC) which serve as the central focus for all transportation operations in the state. Their job is to manage the flow of traffic on the highways and coordinate response for traffic incidents. The North TOC covers both Middlesex and Somerset Counties. TOC North has 48 permanent Variables Message Signs (VMS), 12 portable VMS, 7 HAR sites, 86 cameras, and 17 monitors. It can also manipulate 123 traffic signals. TOC North thus has the ability to both monitor and control traffic conditions, and to inform motorists of real-time conditions.

The Incident Management Unit at TOC North coordinates with local emergency service responders to efficiently manage incidents. The Emergency Service Patrol continuously travels 173 miles of interstate highways across New Jersey, seeking to aid distressed motorists. (Studies indicate that freeway service patrols can result in a sharp reduction in the time needed to respond to and clear incidents.) A number of projects are also in progress at NJDOT, including the improvement of Hazardous Materials clearance, and speeding up accident verification. TOC North provides data on real time traffic conditions that is posted at NJCommuter.com.

TRANSCOM (Transportation Operations Coordinating Committee) – This is a consortium
of 16 different transportation agencies in the New York-New Jersey-Connecticut Tri-State area
which has the mission of establishing a regional cooperative approach to transportation
management; the most prominent agencies in New Jersey include NJDOT, the NJ Turnpike,
and the Garden State Parkway.

9.2.2 Data Collection

Traffic data can be collected through ITS in several ways. The following are the most common methods:

- **In-pavement detectors** These are becoming less popular than non-intrusive flow detectors, since they require shutting down a roadway to install, as well as to service. This would present a significant obstacle for the roadways in question.
- Doppler radar This provides a high level of accuracy when traffic is moving reasonably well, but is not as accurate when traffic is stopped or moving slowly, and thus not recommended as a stand-alone device for the study area. Speed detectors are currently used to determine speeds on I-80, but its accuracy is suspect. Even a small movement in the radar detector can result in inaccurate information on speeds.
- **Passive-infrared detectors** Although slow in response compared to Doppler radar or laser, they require very low power, and do not use expensive components. However, they do not measure speeds of fast-moving vehicles very accurately.

Because the strengths of the Doppler radar and Passive infrared detectors complement each other, and address each other's weakness, these two devices are typically recommended to be combined into the same application for use on roadways.

• EZ Pass Tag Readers – Perhaps the most promising speed detection device in the study area involves the use of EZ Pass tag readers. Given the frequent use of the NJ Turnpike and the Garden State Parkway by area motorists, many vehicles are equipped with EZ Pass (one estimate is that roughly half the vehicles in central New Jersey have EZ Pass). TRANSCOM is sponsoring the TRANSMIT (TRANSCOM's System for Managing Incidents and Traffic) project, in which detectors along the roadside read EZ Pass tags. By reading the sequential progress of an EZ Pass through the study area, the readers can accurately determine the travel time,

and therefore travel speed, between fixed points. EZ Pass readers have been installed throughout the New York metropolitan area, on over 100 miles of toll and non-toll roadways, including four counties in New Jersey. Many motorists in the area are familiar with the VMS signs on approaches to the George Washington Bridge, indicating the number of minutes to New York City using either the upper level or lower level of the bridge; these are the actual travel times as collected through TRANSMIT readers.

There had been consideration of installing TRANSMIT readers the length of the NJ Turnpike, at an average spacing of two miles, but this has been postponed due to fiscal constraints. The readers are currently mounted on the Turnpike only between Exits 6 and 8A. In the future, rather than installing EZ Pass readers at regular intervals, they may be mounted only in the vicinity of interchanges.

Most important from the perspective of the I-287 Plan, it had been planned to install TRANSMIT readers along I-287, but the funding did not materialize. Deployment costs are about \$30,000 to \$50,000 per TRANSMIT reader; lower costs are possible if installed at sites with utilities. Operating and maintenance costs are about 15% to 20% of installation costs. Because of the significant costs required to deploy TRANSMIT across the state, there have been suggestions to privatize and sell the collected information.

 Closed-Circuit TV (CCTV) – Closed-Circuit TV is another valuable method of data collection, although it is not a speed detection device. Cameras are widely used on state and national highways across New Jersey, and are particularly valuable for the detection of incidents and analysis of roadway conditions. The only CCTV coverage on I-287, however, is at the interchange with I-80, well north of the study area. Video images from this location, and 85 other locations across northern and central New Jersey, are transmitted back to the NJDOT TOC North and posted on the NJCommuter.com website every 30 seconds to 2 minutes.

Nationally, some jurisdictions have elected to install CCTV cameras on key roadways every half mile, which provides seamless coverage of that roadway. NJDOT has decided to install CCTV cameras every 2 miles, on average, with the goal of providing coverage of key decision and accident points They are mounted as high as possible – typically 40-50 feet – to provide a larger visual field and longer sight distance. The installation of a camera, including contractor costs, is typically about \$90,000.

TOC North is spearheading the installation of CCTV on key highway corridors in New Jersey. The presence of CCTV on I-287 within the study area is largely dependent upon the progression of the installation of fiber optic cable on these highway corridors. Initially, NJDOT identified target points across the state with the greatest need for CCTV, and cameras were installed at these locations, even if it meant transmitting data back to TOC via phone lines. TOC North has since decided that all CCTV installations should be linked to TOC via fiber optic cables, which can transmit much more information than phone lines.

Fiber optic cable has been installed on a number of important roadways: I-80, Route 1, Route 9, Route 18, Route 38, Route 70, Route 73, U.S. 30, and the NJ Turnpike. However, on I-287, fiber optic cable has been installed only on a relatively abbreviated section in Morris County.

TOC has identified 13 "missing link" priorities, of which number 10 is the section of I-287 from Hanover Avenue to Route 1. This section encompasses the study area.

9.2.3 Arterial Management

As noted above, arterial management systems are intended to facilitate smooth traffic flow along arterial roadways. There are two arterials in the study area: Easton Avenue and River Road. Both experience recurrent congestion. Following are some of the most conspicuous congestion locations on these roadways, as well as I-287:

- Southbound I-287 traffic exiting at Interchange 10, particularly in the PM peak hour queuing can extend for up to one mile
- Southbound I-287 traffic exiting at Interchange 9 congestion is typically less significant than at Exit 10, but can be complicated by entering southbound traffic from Easton Avenue
- Northbound I-287 traffic at Interchange 10, particularly in AM peak hour. It should also be noted that significant northbound congestion on I-287, extending for miles to the north, often begins at this point.
- Northbound on Easton Avenue approaching I-287 northbound on-ramp, particularly in the AM peak hour. Delays here are generated by back-ups from I-287.
- Northbound on River Road at Centennial Avenue and at Plainfield Avenue.
- Northbound left turn on Easton Avenue at Cedar Grove Lane, both AM and PM.

Of these locations, the most enduring congestion is experienced northbound on River Road and on Easton Avenue approaching the interchange area; southbound on I-287 at Interchange 10; and northbound on I-287 at Interchange 10. Two ITS techniques with potential to improve traffic flow in the study area are signal coordination and transit signal priority.

- Signal Coordination One of the most direct means to control traffic flow is through coordinating traffic signals. As mentioned earlier, however, there are relatively few traffic signals in the study area to coordinate. On Easton Avenue, northbound vehicles pass through a signal at Cedar Grove Lane and at Davidson Avenue. Although a signal is present at the intersection of Easton Avenue and World's Fair Drive, it controls only traffic on World's Fair Drive, not Easton Avenue. Because of the distance between the signals at Cedar Grove Lane and Davidson Avenue about 3700 feet coordinating these two signals would have little effect. On River Road, signals are present at Centennial Avenue and Plainfield Avenue. These signals, which are separated by only about 1000 feet, are not coordinated.
- Transit Signal Priority FHWA classifies Transit Signal Priority (TSP) as an Arterial Management system, because it is typically implemented through coordinating signals along an arterial roadway. TSP involves the ability of traffic signals to identify an approaching bus; the signal controller either extends a green light, or shortens a red light, to help the bus get through the intersection without stopping. The experience of TSP in 10 cities, in both the US and abroad, has resulted in a reduction in bus travel time from –2% to 20%.

The technology has not seen widespread use in New Jersey, but based upon the 2002 ITS Deployment Survey on the FHWA website, it is being used for 18 intersections in Jersey City and three in Essex County. None of these intersections serve NJ TRANSIT buses.

Newer, computerized signal controllers can easily be modified to accept TSP equipment. The cost typically ranges from \$8,000 to \$35,000 per signal. Once the appropriate technology is installed at a traffic signal, there is a minimal cost involved in providing vehicles the means to activate the device. A radio-frequency antenna installed in a traffic signal controller reads a transponder on a bus (which is essentially the same thing as the EZ Pass tag in vehicles). The cost to equip each bus ranges from \$500 to \$2,000, depending upon the age of the bus.

Although similar in some respects to signal preemption devices for emergency vehicles, there are some important differences. The signal preemption for emergency vehicles would be activated under all circumstances, at all times of the day. Once the signal detects the presence of an emergency vehicle, it interrupts the normal signal operation to provide a green phase to the emergency vehicle for as long as it takes to clear the intersection. Many jurisdictions with TSP only activate the signal priority if the bus is running late. Further, the green phase would not be maintained for the bus for the entire time it was within range of the signal. Rather, the signal would provide a modest extension to the phase for the bus.

In any event, the goal of TSP is to expedite the movement of buses along their routes, permitting them to better maintain their schedule, and providing an incentive for people to choose transit for their work commute. Since the transit buses in the study area are seriously delayed at relatively few locations, application of these technologies would result in significant time savings for the transit user.

The technique of queue jumping is often combined with the use of transit signal priority. This refers to the use of special traffic signals that permit buses to "jump" traffic queues and enter intersections before other vehicles. The use of queue jumping depends on being able to dedicate a traffic lane or a shoulder to exclusive bus use at a signalized intersection. This is problematic in much of the study area, where there is not available room for a bus lane or shoulders. Limited right-of-way on Easton Avenue, River Road and Cedar Grove Lane would inhibit use of this technique.

9.2.4 Incident Management

For the study area, ITS will likely to be most useful in responding to incidents. Because of the recurring congestion experienced during the peak hours on I-287 between Interchange 10 and 9, and on proximate county roadways, even small incidents have the ability to quickly snarl the movement of traffic. NJDOT estimates that for every minute of an incident, there are four minutes of resulting delays. It is also estimated that a highway accident increases the risk of an additional accident by six times, typically a rear-end crash when motorists passing through the area are "rubbernecking."

Studies vary as to the efficacy of incident management, but are unanimous in their conclusion that incident management reduces the duration of the typical incident. In a 2001 report, the US Department of Transportation summarized expected benefits from ITS (FHWA, *Intelligent Transportation Systems Benefits and Costs.*) One study in Georgia examined benefits from a system that integrated freeway and incident management operations. It found that use of the two systems together resulted in a total response and dispatch time of two minutes, a 30% reduction; a 23-minute reduction in incident duration; and a 2.3:1 benefit-cost ratio. In the 2003 edition of ITS

Benefits and Costs, the FHWA referenced a study of the Coordinated Highways Action Response Team in Maryland which found that the system reduced average incident duration by 57% in 2000 and 55% in 1999.

Cities that monitor roadways are able to remove disabled vehicles 50% faster than other jurisdictions. Therefore, the implementation of an incident management system is highly recommended for the study area.

The primary goal of incident management systems is to decrease the time needed to detect incidents; reduce the time for responding vehicles to arrive; and decrease the time needed to restore normal flow on the roadway. Incident management can be divided into three categories:

- Surveillance
- Detection
- Response

Both surveillance and detection are provided by the same instrument. The EZ Pass tag readers described above are also routinely used by TRANSCOM partnership agencies for incident detection. In general, if speed detectors are installed at sufficient regularity on a roadway, and detectors indicate that roadway speeds slow abruptly, it is possible to roughly identify the location of the bottleneck. However, the cause of the bottleneck will remain uncertain in the absence of a field investigation.

Perhaps the most common method of incident detection consists of motorists calling 911 on their cell phone. However, motorists frequently misapprehend the nature of the incident, or, more typically, its location. Studies indicate that motorists are incorrect close to half the time when queried on the location of an incident – i.e., eastbound or westbound, northbound or southbound. One inexpensive means that can begin to address this problem is the use of milepost markers with the direction prominently displayed, as provided for in Section 2E.54 of the Manual on Uniform Traffic Control Devices (MUTCD). These markers, known as Enhanced Reference Location Signs, consist of vertical panels. The top line identifies the cardinal direction of the roadway, the second line shows the applicable route shield, and the third and fourth lines provide the milepost.

However, the most reliable means of identifying the nature and location of an incident does not depend on passing motorists. For this purpose, the use of CCTV is the most appropriate. By providing an image of the incident area to the traffic operations center, much of the guesswork of the nature of the incident, and the exact location, can be eliminated.

9.2.5 Traveler Information

Nationwide, state and local transportation agencies are increasingly providing information on current traffic conditions and expected travel times to motorists. These services allow motorists to make informed decisions for trip departures, routes, and modes of travel. Studies show a variety of benefits from traveler information systems. A study of the Travel Advisory Telephone System in San Francisco showed that 81% of travelers receiving specific route information changed their travel behavior. Studies in Detroit, MI, and Seattle, WA, have shown slight improvements in corridor capacity with the provision of traveler information.

New Jersey currently provides two types of information to motorists, both available on the NJCommuter.com website (traffic data is channeled through NJDOT's TOC North, but a private firm, SmartRoutes, actually maintains the real-time elements of NJCommuter.com website):

- Visual images of the roadways, provided by CCTV's mounted along the roadway.
- Textual information on congestion or incidents on roadways. It should be noted that the description of congestion on the NJCommuter.com website can be rather general, however.

TRANSCOM is the sponsor of the Trips123 Program. Similar to NJCommuter.com, the Trips 123.com website uses information provided by the TRANSMIT regional architecture and other agencies to identify incidents on roadways across the New York metropolitan area. This website also recommends the best way of combining transit services to travel between two points in the study area. In the future, Personal Traveler Services will be added, in which real-time travel alerts will be sent to motorists, via email or a mobile device, for their specific route of travel.

Participants in the I-287 Mobility Plan focus groups have expressed the greatest interest in providing information to persons working in the study area, and who could thus use this information to travel on alternate routes, or to leave work at a later time. In part, this is due to the likely difficulty in conveying information on alternative routes to motorists unfamiliar with central New Jersey. Many of the roadways that could be used as alternative routes to I-287 experience periodic congestion of their own, and pressing these roadways into service would thus typically result in high levels of traffic delay. Therefore, information on alternate routes should only be communicated to motorists when major incidents occur on I-287, such as fatal accidents, major trailer tractor crashes, or hazardous waste spills. In such events, two if not all three lanes in one direction could be shut down. When such events occur, emergency services may have no recourse except to divert traffic to local roadways, to prevent complete paralysis of traffic on I-287.

TOC North has designated alternative travel routes for I-287 through the study area. For example, if an incident occurs on northbound I-287 between Interchange 12 and 13, the primary alternate route would consist of the motorist exiting to Weston Canal Road, followed by Edgewood Terrace, Van Sickle Boulevard, South Main Street, East Main Street, East Street, and Route 28. An incident on I-287 northbound between Interchange 9 and 10 would find traffic diverted to River Road, Landing Lane, and Easton Avenue, thence back to I-287. It should be noted that TOC North has only designated alternative routes for Somerset County, and not for Middlesex County.

9.3 Strategies

1. Coordinate new data collection efforts with NJDOT TOC and TRANSCOM.

As described above, it is important to begin most ITS efforts with a dependable yet sophisticated data collection device. Most data collection devices will range beyond the expertise of local and even county engineering departments. Therefore, any new data collection, dissemination and dispatch efforts should be coordinated with the NJDOT Traffic Operations Center North and, by extension, TRANSCOM.

2. Install CCTV and EZ Pass Tag readers on study area roadways.

Since the installation of fiber optic cable is posited by NJDOT as critical to the use of CCTV in the study area – and possibly critical to the use of other data collection devices – local area

representatives should maintain pressure on NJDOT to install fiber optic cable along I-287 in the study area as soon as possible. Similarly, local representatives should maintain pressure on TRANSCOM to install EZ Pass tag readers along I-287 as soon as possible; this strategy is discussed in greater detail under Traveler Information, below.

3. Investigate coordination of traffic signals on River Road.

Piscataway Township and Middlesex County should investigate the potential coordination of traffic signals at the intersections of River Road with Plainfield Avenue, and River Road with Centennial Avenue. (Although River Road is a county roadway, these signals are maintained by Piscataway Township.)

4. Investigate Transit Signal Priority for key signalized intersections in study area.

Transit Signal Priority (TSP) systems should be investigated for the study area as a means of expediting the movement of transit vehicles on area roadways, and thus permitting them to run on schedule a greater percentage of time. This, in turn, may help to attract a greater numbers of riders to local transit services, and give Somerset County and NJ TRANSIT greater flexibility in devising route modifications.

For the NJ TRANSIT 980 bus, TSP would be appropriate on River Road at Plainfield Avenue. For the SC-2 DASH, delays can be most significant at the signalized intersections proximate to the New Brunswick train station, specifically on Route 27 at Easton Avenue, and TSP should thus be investigated for this area. Delays are also encountered in Franklin Township on New Brunswick Road at Cedar Grove Lane, Davidson Avenue at Easton Avenue, and Easton Avenue at Franklin Boulevard. At the last signal, buses are sometimes unable to clear the intersection for several signal cycles. For the SC-1 DASH, TSP would be appropriate at the intersection of Davidson Avenue at Easton Avenue. Relatively few delays of consequence are encountered within Bound Brook Borough or South Bound Brook Borough.

The above locations would be the most appropriate for TSP, since they involve the longest waiting times for buses on the corridor. Since the frequency of bus runs through the study area is relatively little, the use of TSP would have minimal impact on traffic conditions at these locations.

5. Enhance incident management through installation of CCTV along I-287, and coordination with NJDOT TOC.

The greatest advance in incident management would come from the installation of CCTV along I-287 in the study area; local representatives should thus maintain pressure on NJDOT to install these devices.

As noted earlier, alternative routes are not designated for Middlesex County in the event of a major incident on I-287. The County should thus coordinate with TOC North to ensure that the most appropriate roadways are selected.

6. Improve existing traveler information services.

Greater specificity needs to be added to the description of traffic conditions on the NJCommuter.com website. Ideally, motorists should be informed of ambient travel speeds, and

actual travel times between key destinations on area roadways, and the extent of delays caused by incidents.

The greatest amount of value can be added to traveler information by providing information to motorists on the optimal route to travel given existing roadway conditions. Information at this level is increasingly provided by private companies, which charge subscribers a monthly fee for this information. As noted earlier, TRANSCOM has entertained the possibility of selling data to companies that, in turn, can package the data and interpret it for the benefit of motorists.

The attractiveness of such a subscription service depends in part on the ability to monitor traffic conditions on the greatest number of major and minor arterial roadways across a region. An example of the desirability of this can be seen in the two major county routes in the study area: River Road and Easton Avenue. Motorists with origins to the north of Interchange 10, and destinations in the New Brunswick/Highland Park/Edison area or the east; or vice-versa; have the choice of accessing their destination via River Road or Easton Avenue. Data would thus need to be collected on travel conditions on these two roadways, combined with data collected at Interchanges 9 and 10, to provide motorists with the recommended route.

To increase the usefulness of such a traveler information system, data should be collected from as many arterial roads as possible in central New Jersey. This would be much more expensive, since it would involve a significant expansion of existing data collection devices; however, it would make a subscription service more valuable. Such an expansion of data collection devices could involve the use of TRANSMIT readers. The counties and municipalities within the study area should thus coordinate with TRANSCOM on extending the TRANSMIT system. Based upon interviews with I-287 study team, TRANSCOM has indicated that it would welcome working with local jurisdictions in the future on expanding this data collection effort.

Under situations in which sections of I-287 were shut down or seriously impeded, information could be provided to motorists through the use of Variable Message Signs (VMS) or Highway Advisory Radios (HAR). VMS should be posted on I-287 prior to key decision points. VMS posted at some distance from the study area could alert motorists to the presence of an incident between the two listed interchanges; VMS closer to the study area could indicate the alternative route.

10.0 OTHER ISSUES

The I-287 Mobility Plan study has focused on strategies to manage travel demand, as a complement to the physical improvements proposed in the *I-287 Interchanges Planning Study*. Given the presence of industrial and distribution uses in both Franklin and Piscataway Townships, trucks are regularly seen on key study area roadways. The study of freight movement has not been a focus of the six strategy elements in this Plan, but such a study would increase the understanding of traffic movement in the study area, and help lead to recommendations.

As only one example, the study area would benefit in the future if a greater number of trucks serving uses in Franklin Township access I-287 from Weston Canal Road (Interchange 12) rather than Easton Avenue. Traffic congestion at Interchange 12 is not nearly as severe as Interchange 10. However, two factors discourage trucks from using the Weston Canal Road interchange, as follows:

- 1. The southbound exit ramp from I-287 to Weston Canal Road is not signalized. Since trucks accessing the study area must turn left at the end of this ramp, and therefore find an opening in what can be significant traffic volumes along Weston Canal Road, delays are sometimes considerable.
- 2. Another problem is the intersection of Weston Canal Road and Cottontail Lane. The corner radius is particularly tight for trucks turning from Cottontail Lane onto Weston Canal Road. Existing site constraints will make it difficult to ameliorate this problem, given the presence of the D&R Canal west of Weston Canal Road, and the embankment on the southeast corner at the Ramada Inn.

If both of these issues could be addressed – coupled with signing improvements – Interchange 12 could have the potential to attract some trucks that are currently using Interchange 10.

Other freight issues should also be reviewed as part of this proposed study.

11.0 IMPLEMENTATION MATRIX

The I-287 Mobility Plan identifies 39 strategies in six different areas to improve travel conditions in the study area. It should be emphasized that many of these strategies are inter-related, and depend upon the implementation of strategies in other areas to be effective. For example, travel demand management strategies will become more viable if transit services are enhanced in the study area. Transit services, in turn, will benefit from the installation of sidewalks linking businesses to bus shelters. Demand for transit services will increase if smart growth strategies are following in developing future land uses in the study area. There are many other examples of inter-relationships. In short, providing employees and residents in the study area with real alternatives to driving alone in the peak traffic hours will require a dedicated and comprehensive planning effort.

The following matrix summarizes all the strategies recommended in the I-287 Mobility Plan, and identifies potential implementation partners, agencies that could provide funding or planning assistance, and the potential time frame for implementation (short is less than one year; medium is from one to three years; and long is greater than three years).

				Funding and/	Time
Area	No.	Strategy	Lead Agency	Assistance	Frame
Travel Demand	1	Increase financial and other	NJDOT; RideWise;		Medium
Management		incentives for employers and	Keep Middlesex		
Strategies		employees to encourage the use of	Moving;		
		commute options.	Somerset County;		
			Middlesex County;		
			Franklin Township;		
			Piscataway Township;		
			Area employers		
	2	Target TDM outreach efforts directly	RideWise; Keep		Medium
		to individual employees and	Middlesex Moving;		
		residents.	Franklin Township;		
			Piscataway Township		
	3	Increase coordination related to TDM	NJDOT; RideWise;		Short;
		planning and implementation.	Keep Middlesex		On-
			Moving;		going
			Somerset County;		
			Middlesex County;		
			Franklin Township;		
			Piscataway Township;		
			Area business		
			associations and		
			chambers of		
			commerce;		
			Area employers		
	4	Encourage the use of TDM strategies	Franklin Township;		Short
		as part of the local land development	Piscataway Township		
		process			

Table 11.1: Implementation Matrix

				Funding and/ or Planning	Time
Area	No.	Strategy	Lead Agency	Assistance	Frame
Travel Demand Management Strategies (cont.)	5	Increase the viability of alternative transportation modes.	NJDOT; NJ TRANSIT; RideWise; Keep Middlesex Moving; Somerset County; Middlesex County; Franklin Township; Piscataway Township;		Long
Transit Strategies	1	Implement modifications to existing shuttle routes to serve more destinations.	Somerset County; Middlesex County; NJ TRANSIT		Short
	2	Add new shuttle routes to serve areas not currently served by existing routes.	Somerset County; Middlesex County; NJ TRANSIT	NJDOT; NJTPA	Medium
	3	Modify existing transit schedules to include more frequent service, additional service runs to accommodate the schedules of shift workers and to better connect with other transit services, especially trains arriving and departing from the New Brunswick and Bound Brook train stations.	Somerset County; Middlesex County; NJ TRANSIT		Short
	4	Implement bus service complements to increase the attractiveness and visibility of existing services.	Somerset County; Middlesex County; NJ TRANSIT; Franklin Township; Piscataway Township	NJ TRANSIT; NJDOT; NJTPA	Short
Smart Growth Land Use and Transit-Friendly Design	1	Revise and adopt comprehensive circulation plan elements that fully address all modes of transportation.	Franklin Township; Piscataway Township	Somerset County; Middlesex County	Short
Strategies	2	Increase connectivity for all modes within and between existing and future development.	Franklin Township; Piscataway Township; Developers	Somerset County; Middlesex County; NJDOT	Medium; On- going
	3	Encourage a greater mix of uses in non-residential districts and ensure densities are compatible with transit service.	Franklin Township; Piscataway Township; Developers	Somerset County; Middlesex County; Office of Smart Growth; Regional Planning Partnership	Long

Area	No	Strategy	Lead Agency	Funding and/ or Planning Assistance	Time Frame
Smart Growth Land Use and Transit-Friendly Design Strategies	4	Adopt design standards and guidelines to enhance the built environment, promote walking and walking and encourage transit- friendly development.	Franklin Township; Piscataway Township	Somerset County; Middlesex County; Office of Smart Growth	Medium
(cont.)	5	Revise parking standards to encourage trip reduction and use of alternative modes.	Franklin Township; Piscataway Township		Short
	6	Consider the creation of "Special Improvement Districts" to encourage business development, support infrastructure enhancements in commercial areas and provide operating support for additional transit services.	Franklin Township; Piscataway Township; Area businesses	NJ Department of Community Affairs	Short
	7	Encourage community and stakeholder involvement as part of any smart growth planning initiative.	Franklin Township; Piscataway Township	Somerset County; Middlesex County; Office of Smart Growth;	Short; On- going
Pedestrian and Bicycle Strategies	1	Prepare and adopt municipal-wide pedestrian plans.	Franklin Township; Piscataway Township	Somerset County; Middlesex County; NJDOT	Medium
	2	Amend municipal ordinances to require installation of sidewalks as part of site plan approval.	Franklin Township; Piscataway Township		Short
	3	Install sidewalks along high priority corridors.	Franklin Township; Piscataway Township	NJDOT Local Aid	Long
	4	Implement pedestrian facility improvements at key intersections and mid-block crossings within study area.	Franklin Township; Piscataway Township; Somerset County; Middlesex County		Long
	5	Prepare, adopt and implement comprehensive bikeway plans. (Franklin has comprehensive plan, which it should continue to implement; Piscataway should prepare comprehensive bikeway plan.)	Franklin Township; Piscataway Township	Somerset County; Middlesex County	Medium
	6	Promote bicycling through distribution of bikeway maps.	Franklin Township; Piscataway Township	Somerset County; Middlesex County; Ridewise; Keep Middlesex Moving	Medium

				Funding and/ or	Time
Area	No.	Strategy	Lead Agency	Assistance	Frame
Pedestrian and Bicycle Strategies (cont.)	7	Ensure that study area sidewalks and bicycle facilities provide connections to roadways outside study area.	Franklin Township; Piscataway Township	Somerset County; Middlesex County; Developers	Long
	8	Improve access to D&R Canal.	D&R Canal Commission	Somerset County; Franklin Township	Long
	9	Consider new bicycle- pedestrian bridge crossing of Raritan River and D&R Canal.	Somerset County; Middlesex County	NJDOT Bicycle / Pedestrian Office	Long
	10	Extend Johnson Park Bikeway.	Middlesex County	Piscataway Township	Long
	11	Use innovative mechanisms to fund construction of sidewalk and bike improvements.	Franklin Township; Piscataway Township	Property owners	Long
	12	Prepare and adopt maintenance plans for pedestrian and bicycle facilities.	Franklin Township; Piscataway Township		Short
Wayfinding Signage Strategies	1	Revise signage for I-287 southbound motorists exiting in Franklin Township.	Somerset County; NJDOT Bureau of Outdoor Advertising		Short
	2	Install signing to direct Franklin Township hotel district visitors to I-287.	Franklin Township; Somerset County		Short
	3	Remove unauthorized signage from Easton Avenue.	Somerset County		On- going
	4	Revise signing for hotels in Piscataway Township.	Middlesex County; NJDOT Bureau of Outdoor Advertising		Short
	5	Revise signing for truck weigh station on northbound I-287.	NJDOT		Short
Intelligent Transportation Systems Strategies	1	Coordinate new data collection efforts with NJDOT and TRANSCOM.	Somerset County; Middlesex County; NJDOT TOC; TRANSCOM: NJTPA		Long
	2	Install CCTV and EZ Pass tag readers on study area roadways.	NJDOT; TRANSCOM, NJTPA		Medium
	3	Investigate coordination of traffic signals on River Road.	Piscataway Township	Middlesex County	Medium
	4	Investigate Transit Signal Priority for key signalized intersections in study area.	Franklin Township; Piscataway Township; County Engineering Departments	NJ TRANSIT ITS Department	Long
	5	Enhance incident management through installation of CCTV along I- 287, and coordination with NJDOT TOC.	Franklin and Piscataway Township Emergency Management; NJDOT TOC, NJTPA		Long
	6	Improve existing traveler information services.	NJDOT; TRANSCOM, NJTPA		Long
12.0 APPENDIX

The following lists indicate persons on the Steering Committee, and participants in the Focus Groups.

Steering Committee

<u>Name</u>	Organization
Donna Allison	Ridewise
James Amon	D&R Canal Commission
Norteza Ansari	Keep Middlesex Moving, Inc.
Robert Bzik	Somerset County Planning
Jon A. Carnegie	Alan M. Voorhees Transportation Center
Jpendra Chivukula	Franklin Township
Dawn Corcoran	Piscataway Township Planning
Jim Crane	Ridewise
Teresa Danile	Franklin Township Council
John M. Donnelly	Piscataway Township Planning
Shirley Eberle	Franklin Township
Camille Fernicola	Middlesex County Freeholder
Tony Gambilonghi	Middlesex County Planning Board
Steve Goldmacher	Philips Lighting
Gary Howarth	Franklin Township Office of Emergency Management
Amy Kennard	New Jersey Department of Transportation
awrence Kolodzicj	Middlesex County Engineering
Daniel Kueper	Orth-Rodgers & Associates, Inc.
Walter Lane	Somerset County Planning Board
Steve Lax	NJ TRANSIT
Brian Levine	Franklin Township Mayor
John Loos	Delaware & Raritan Canal Commission
David Lorimer	Somerset County Engineering
Jerome M. Lutin	NJ TRANSIT
John Maddocks	Business Partnership of Somerset County
Pete Mattos	Rotor Clip, Inc.
Jack E. Molenaar	Rutgers University Parking and Transportation Services
John Norwig	Somerset County Engineering
Peter Palmer	Somerset County
Christopher J. Phelan	Middlesex County Regional Chamber of Commerce
Frank Romano	Piscataway Township Chamber of Commerce
Khalilah Stewart	Franklin Township Planning
Robert Thomas	Franklin Township Zoning Board
Ron Tindall	The North Jersey Transportation Planning Authority
Brian Tobin	Association of General Contractors of New Jersey
George M. Ververides	Middlesex County Planning Board
Robert Vornlocker	Franklin Township Police
Brian C. Wahler	Piscataway Township Mayor
Robert Zaborowski	Somerset County Freeholder
Thomas Zilinek	Franklin Township Engineering

Focus Groups

Name Morteza Ansari Robert Bzik Jon A. Carnegie Dawn Corcoran James Crane John M. Donnelly Benjamin Donsky Tony Gambilonghi Frank Hasner Paul Holden Scott lannuzzo Richard Kish Daniel Kueper Walter Lane Andrea Lubin Pete Mattos Jack E. Molenaar Michael Moser John Norwig James Perry Herb Peterson Frank Romano Paul Snyder John A. Stephens Khalilah Stewart AI Tavares Ron Tindall George M. Ververides Robert Vornlocker Ed Wapinski

Organization Keep Middlesex Moving, Inc. Somerset County Planning Alan M. Voorhees Transportation Center **Piscataway Township** Ridewise **Piscataway Township** Alan M. Voorhees Transportation Center Middlesex County Planning Board Franklin Township Economic Development Department Doubletree Hotel **Piscataway Township Police** Dow Chemical Orth-Rodgers & Associates, Inc. Somerset County Planning Board Alan M. Voorhees Transportation Center Roto Clip, Inc. Rutgers University Parking and Transportation Services Holiday Inn Somerset Somerset County Engineering Piscataway Township Somerset County Traffic Safety Piscataway Township Chamber of Commerce Piscataway Township Office of Emergency Management Garden State Exhibit Center Franklin Township Planning/ Zoning New Jersey Department of Transportation The North Jersey Transportation Planning Authority Middlesex County Planning Board Franklin Township Police Piscataway Township

Somerset County 2005

Somerset County Board of Chosen Freeholders

Rick Fontana, Freeholder Director Ken Scherer, Freeholder Deputy Director Denise M. Coyle, Freeholder Peter S. Palmer Freeholder Robert Zaborowski, Freeholder

Somerset County Planning Board Members

Bernard V. Navatto, Jr., Chairman Jules Lobai, Vice Chairman Bill Rathjen Ed Francfort Jo-Ann Liptak Shawn N. Lipani Kenneth Brenn, 1st Alternate Rick Fontana, Freeholder Director Robert Zaborowski, Freeholder Liaison Michael J. Amorosa, County Engineer/Board Secretary Denise M. Coyle, Alternate to Freeholder David J. Lorimer, Alternate to County Engineer

John M. Lore, Esq., Deputy County Counsel for Planning

Somerset County Planning Division Staff

Robert P. Bzik, AICP/PP, Director of Planning Anthony V. McCracken, Sr., AICP/PP, Administrative Planner Patricia McGarry, Manager, Cultural & Heritage Sally de Barcza, Programs Coordinator Diana Vigilante, Manager, Office of Solid Waste Management Pamela Lewis, Recycling Coordinator Thomas R. D'Amico, AICP/PP, Supervising Planner Laurette Kratina, AICP/PP, Principal Planner Walter Lane, AICP/PP, Principal Transportation/Land Use Planner Kenneth Wedeen, AICP/PP, Principal Planner Brent Krasner, Principal Community Planner Erika L. Webb, Senior Planner Roger Keren, Senior Planner Eric Lips, Planner Tatiana Kika, Principal Draftsperson Andrew Phillips, Draftsperson Lillian M. Zuza, Office Manager Melissa Harvey, Administrative Assistant Patrice Thomas, Administrative Assistant Cynthia Mellusi, Administrative Assistant Michele Knight, Administrative Assistant

> Somerset County Planning Board 20 Grove Street, P.O. Box 3000 Somerville, NJ 08876-1262 (908) 231-7021 Fax (908) 707-1749 E-mail: Planning Board@co.somerset.nj.us

Middlesex County 2005

Middlesex County Board of Chosen Freeholders

David B. Crabiel, Freeholder Director Stephen J. "Pete" Dalina, Deputy Director Camille Fernicola, Freeholder H. James Polos, Freeholder John Pulomena, Freeholder Christopher D. Rafano, Freeholder Blanquita B. Valenti, Freeholder

Thomas Kelso, Esq., County Counsel Walter DeAngelo, County Administrator Ms. Margaret E. Pemberton, Clerk to the Board

Middlesex County Planning Board

Thomas F. Boylan, III, Chairman Henry Miller, Vice Chairman David B. Crabiel, Freeholder-Director Camille Fernicola, Freeholder John J. Reiser, Jr., County Engineer Francis X. Gagnon Steven J. Imperato G. Frederick Semoneit Olga Sgambettera Kiran R. Desai, Alternate Member Eric Wong, Alternate Member

Steven D. Cahn, Esq., Counsel Dorothy Power, Secretary George M. Ververides, Director of County Planning

Middlesex County Transportation Coordinating Committee

John J. Hogan, Chairman Richard Zipp, Vice Chairman Camille Fernicola, Freeholder Anne L. Hummel, Secretary

Middlesex County Department of Planning Staff

George M. Ververides, AICP, PP, Director of County Planning Anthony Gambilonghi, AICP, PP, Supervising Planner, Transportation Bruce McCracken, Principal Planner, Transportation Carolina Granick, PP, Principal Planner Anne L. Hummel, Secretarial Assistant, Typing William J. Kruse, AICP, PP, Assistant Planning Director, Division of Comprehensive Planning, Environment and Parks Matthew Flannery, PP, Supervising Planner, Division of Comprehensive Planning, Environment and Parks Richard Hills, Division Manager, Solid Waste Management Stan Olszewski, Supervising Planning, Land Development Review