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Federal Project No. STP-IXAF-33 (131)

Penns Neck Area EIS

Route 1 Section 2S and 3J

West Windsor Township,
Mercer County, New Jersey
and
Plainsboro Township,
Middlesex County, New Jersey

DRAFT ENVIRONMENTAL IMPACT STATEMENT/ SECTION 4(F) EVALUATION

U.S. Department of Transportation
Federal Highway Administration
and
New Jersey Department of Transportation

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5-20-03

Richard W. Gramlich, PE, Director of Project Management — Date
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Executive Summary

EXECUTIVE SUMMARY

INTRODUCTION

The Federal Highway Administration (FHWA), in cooperation with the New Jersey Department of Transportation (NJDOT), proposes to make transportation improvements to address traffic congestion, mobility constraints and safety concerns on Route 1 and east-west cross streets in the Penns Neck area of West Windsor Township, Mercer County, New Jersey and its environs. This Environmental Impact Statement (EIS) was prepared to investigate and document potential impact that may result from the Action and No-Action Alternatives under consideration. The EIS was prepared in accordance with the implementing regulations of the National Environmental Policy Act (NEPA)of 1969 (42 United Stated Code (USC) 4321 et seq.), Section 4(f) of the Department of Transportation Act of 1966 (23 USC 138 and 49 USC 303), and the FHWA Guidance for Preparing and Processing Environmental and Section 4(f) Documents (Technical Advisory T 6640.8A, 1987).

PROJECT HISTORY AND BACKGROUND

In 1986, NJDOT completed the Route 1 Corridor Transportation Study. The study examined growth trends and future infrastructure needs along the 19-mile segment of Route 1 between Trenton and New Brunswick. The study identified a variety of corridor needs and highlighted a number of important policies regarding the future of the Route 1 corridor in Mercer and Middlesex Counties. Consistent with this policy direction, NJDOT, in the mid-1980s, initiated a number of projects intended to implement the corridor study recommendations by developing improvement plans for each of the priority intersections. NJDOT issued an Environmental Assessment (EA) of this corridor improvement plan in March 1991.

Improvement plans in the Penns Neck area included five alternative alignment schemes for eliminating the Penns Neck area traffic signals at Washington Road (CR571), Fisher Place and Harrison Street and replacing them with a single grade-separated interchange in the vicinity of Washington Road and Harrison Street. In 1994, NJDOT conducted project-related studies, including an alternatives analysis, interim improvement studies, an environmental constraints study and a hazardous waste screening.

In 1998, the NJDOT, in partnership with the Delaware Valley Regional Planning Commission (DVRPC), performed a Congestion Management System (CMS) study related to increasing roadway lane capacity in the Penns Neck area (Final Version adopted March 26, 1998). The CMS study examined travel demand management (TDM) strategies to determine if a reasonable program of TDM strategies could be implemented that would eliminate the need for the roadway capacity increase. According to the study, to achieve acceptable operating conditions through the project area, a trip reduction of approximately 50% would be needed. The analysis determined that, even if all of the strategies were to be combined, the resulting total would not meet the required trip reduction threshold warranted to eliminate the need for a capacity increase. The results of the analysis are summarized in Chapter 2.

NJDOT issued a Draft EA for the Route U.S. 1/Penns Neck Area Improvements in September 2000. The Draft EA met with significant opposition from some local officials as well as various community and environmental groups. In November 2000, then Governor Christine Todd

Whitman ordered that a full EIS be prepared. In March 2001, NJDOT initiated this EIS process to reassess and redefine the problem of mobility in the Penns Neck Area and its environs and to examine a full range of possible actions and alternatives to address Penns Neck area traffic congestion and mobility constraints.

PUBLIC INVOLVEMENT OVERVIEW

The agency coordination and public involvement program for the Penns Neck Area EIS, which was comprehensive and extensive, was implemented throughout the 24-month scoping and EIS process. It was developed in full compliance with federal public involvement regulations and significantly exceeded NEPA requirements for preparation of an EIS. It was specifically designed as an open and ongoing process aimed at establishing and maintaining effective dialogue between interested and involved constituencies, stakeholders and public agencies.

The program's principal objective was to facilitate open lines of communication and information-sharing, active engagement, and maximum participation of the public throughout the scoping, strategy screening, alternatives evaluation, and impact analysis phases of the EIS process. This was achieved through a multi-faceted cooperative approach that involved municipal, state, regional and federal agencies, as well as a broad spectrum of interested publics.

Specific program elements included: stakeholder interviews, small group listening sessions/meetings, large group forums, project website and six document repositories. A central element of the program involved the convening of the Partners' Roundtable Advisory Committee. The Roundtable, which met 35 times during preparation of the Draft EIS, was composed of community partners from the public, private and nonprofit sectors. Its 32 members represented citizens groups, business organizations and stakeholders; the governments of West Windsor Township, Princeton Township, Princeton Borough, Plainsboro Township, Mercer County and Middlesex County; transportation advocacy groups; FHWA; DVRPC; NJDOT; and other State agencies. All Roundtable meetings were open to the public and, at most meetings, members of the public participated fully in discussions.

The Roundtable engaged in extended dialogue and document review related to all aspects of EIS development, including delineation of the project study area; preparation of a Purpose and Need Statement, Working Problem Statement, definition of project Goals and Objectives, and review of actions and alternatives that were considered for detailed analysis in the Draft EIS. The final two meetings involved the Partners' Roundtable in a synthesis of the DEIS findings. Summary reports of the final two meetings are included in Appendix E.

Information related to the EIS process and public involvement activities were communicated on the project website and in the case of large group forums, display ads were placed in a variety of local and regional newspapers. In addition, notifications were mailed to more than 400 persons included on the EIS mailing list. All project-related data, reports, documents, and presentations were made available on the project website and in six document repositories.

STUDY AREA

The study area for the Penns Neck Area EIS has been structured into overlapping regions, including: the ***primary study area*** (PSA) which is composed of the municipalities of Plainsboro Township, Princeton Borough, Princeton Township and West Windsor Township; and the ***secondary study area*** (SSA), which is composed of twenty municipalities in Mercer, Middlesex and Somerset counties. In addition, a ***core study area*** was defined for considering transportation impacts and several ***resource-specific study areas*** were defined for the purpose of considering other areas of potential impact from the alternatives.

PROJECT PURPOSE AND NEED

Project Purpose

The purpose of the project is to address traffic congestion, mobility constraints and safety concerns on U.S. Route 1 and the east-west cross streets in the Penns Neck area of West Windsor Township, Mercer County, New Jersey and its environs (Figure 1-1).

Past growth trends and existing travel conditions

The PSA, for the past 20 years, has seen robust growth in both employment and population. According to the July 2002 *Local Area Land Use Inventory and Forecast Study* (Urbitran, 2002) prepared for this EIS, between 1980 and 2000 the number of jobs located in the PSA grew from an estimated 29,800 to 57,700. This represents a 94% increase. Over the past two decades, West Windsor and Plainsboro Townships have emerged as significant employment centers in the region. Approximately 46,300 jobs, or 80% of the PSA's employment, is located in these two townships, much of it concentrated between Route 1 and the NEC rail line. Residential growth in the PSA has also been robust. Between 1980 and 2000, population grew from 39,900 to 72,400, an 81% increase. Figures 1-3, 1-4 and 1-5 in Chapter 1 show the location of existing population and employment in the PSA. Figures 3-2 through 3-6 in Chapter 3 demonstrate the important role West Windsor and Plainsboro worksites play in shaping local traffic patterns.

With the exception of Princeton Borough, the land use pattern in the PSA is decentralized and auto-oriented. The dominant land use pattern is single-use office and retail development, built at low density, adjacent to highways with free parking and beyond walking distance from major transit facilities. Residential subdivisions are designed in isolation from one another and other uses and have been built at relatively low densities. These growth trends and land use and traffic generation patterns are projected to continue, against the backdrop of a constrained regional and local transportation infrastructure system.

The transportation facilities that lie at the focal point of this employment and residential growth have severe limitations in their ability to handle growing travel demand. The congested roadway network is marred by discontinuous roads, the absence of a robust grid pattern and absence of grade separations. Existing public transportation services and facilities serving external destinations are well-used but limited in trip purpose, and others serving local travel are not particularly effective in serving the low-density land use pattern of employment sites. The area's bicycle and pedestrian network is not well developed. The utility of these modes is also limited by the area's single-use, low-density land use pattern.

To document existing traffic conditions in the PSA, substantial new data was collected. These data collection efforts included the development of a comprehensive traffic count database, an east-west origin and destination survey and aerial reconnaissance to document existing traffic congestion. This information was used to verify the accuracy of the EIS travel demand forecasting model described in Chapter 4.

The major roads traversing the Penns Neck area include the following:

- *Route 1* is the area's major north-south highway artery. It consists of three travel lanes in each direction with no shoulders. This toll-free road functions both as an inter-regional auto and truck corridor and as a local land access road for properties fronting the highway, including major employment destinations. Approximately 82,700 vehicles per day use Route 1 between Washington Road and Harrison Street.

- *East-west cross streets* in the Penns Neck area include: Alexander Road, CR 571/Washington Road, Fisher Place and Harrison Street. Washington Road is a 2-lane road, which crosses Route 1 at a signal-controlled intersection. Fisher Place, which is located just north of Washington Road, is a residential local street east of Route 1 that also crosses Route 1 at a signal-controlled intersection. Fisher Place is used by many motorists seeking to avoid congestion at the Route 1/Washington Road intersection. Harrison Street is a 2-lane roadway that intersects with Route 1 north of Fisher Place at a signal-controlled intersection opposite the Sarnoff Corporation driveway. Alexander Road crosses Route 1 on an overpass and varies between two and four lanes.

Route 1 traffic through the Penns Neck area is controlled by the three closely-spaced traffic signals at Washington Road, Fisher Place and Harrison Street. Because of the high volume of traffic using Route 1, through movement of traffic on Route 1 is given signal priority over east-west traffic seeking to enter or cross Route 1 at these locations. The combination of high traffic volumes on both Route 1 and signal priority for Route 1 traffic result in significant travel delays on Route 1 and east-west cross-streets in the Penns Neck area and contribute to commuter and resident frustration.

According to travel simulation data from the EIS travel demand forecasting model, average travel time on the 2.4 mile segment of Route 1 between Carnegie Center Boulevard in West Windsor Township and Scudders Mill Road in Plainsboro Township ranges from 4 to 5 minutes in the AM peak hour and 4 to 6 minutes in the PM peak hour.

- There are significant delays at the Washington Road and Harrison Street intersections with Route 1. Average AM peak hour intersection delays on Washington Road approaching Route 1 are 4 minutes in the eastbound direction and 2 minutes traveling westbound. In the PM peak hour, delays approaching Route 1 on Washington Road average 5 minutes in the eastbound direction and 2.4 minutes traveling westbound. AM peak hour delays on Harrison Street approaching Route 1 in the eastbound direction are 8.2 minutes. In the PM peak hour, delays on Harrison Street approaching Route 1 are 6.2 minutes in the eastbound direction. The variability of delays under typical conditions is

broad: the minimum and maximum observed delays varied widely from 0.7 to 11.2 minutes on Washington Road and 0.4 to 11.8 minutes on Harrison Street.

- A measure of mobility in the PSA is east-west travel time. Average east-west travel times between Clarksville Road in West Windsor Township and Nassau Street in the vicinity of Alexander Road, Washington Road and Harrison Street, in Princeton Borough – an average travel distance of 3.6 miles – range from 10 to 13 minutes.

In addition, congested conditions and intersection geometry contribute to high accident rates at the Penns Neck Circle (the Route 1/Washington Road intersection). These congested conditions are perceived by many local officials and residents to impede the ability of emergency personnel to respond effectively.

Growth forecasts and future travel conditions

Growth trends in the PSA, especially for employment, are expected to continue into the foreseeable future. According to the *Local Area Land Use Inventory and Forecast Study* (Urbitran, 2002), an estimated 39,000 new jobs and 8,900 new residents are expected in the PSA by the year 2028, the planning horizon year for the EIS. (See Table ES-1.) The study forecasts that 97% of the PSA's population and employment growth will occur in West Windsor and Plainsboro Townships, where employment is projected to grow 131% and 49% respectively. Given current zoning regulations and the fact that there is 12,750,000 square feet of additional single-use, low-density, campus-style office space already approved by local planning boards in the PSA, it is reasonable to assume that this pattern of development will continue as well. These trends are expected to worsen travel conditions in the Penns Neck area.

Table ES-1
Study Area Population, Households, and Employment 2001-2028

	2001	2028	Absolute Change 2001 -2028	Percent Change 2001-2028
POPULATION				
Plainsboro Twp.	21,865	23,070	1,205	6%
Princeton Borough	15,054	15,137	83	1%
Princeton Twp.	16,947	17,143	196	1%
West Windsor Twp.	22,911	30,343	7,432	32%
Study Area Total	**76,777**	**85,693**	**8,916**	**12%**
EMPLOYMENT				
Plainsboro Twp.	27,266	40,530	13,264	49%
Princeton Borough	5,561	5,680	119	2%
Princeton Twp.	5,854	6,917	1,063	18%
West Windsor Twp.	18,991	43,915	24,924	131%
Study Area Total	**57,672**	**97,042**	**39,370**	**68%**

Source: *Local Area Land Use Inventory and Forecast Study* (Urbitran, 2002)

This projected demographic growth would increase AM peak hour traffic demand on all of the PSA's principal roadways under the No-Action Alternative. On Route 1 northbound, AM peak

hour traffic is estimated to increase by approximately 25%. On Route 1 southbound AM peak hour traffic is projected to increase 33%. The greatest AM peak hour increases on east-west roads are forecast for Alexander Road eastbound east of Route 1 (+102%), Washington Road eastbound west of Route 1 (+157%); Washington Road westbound east of Route 1 (+75%); and Harrison Street eastbound east of Route 1 (+87%).

Travel conditions on Route 1 are expected to worsen noticeably by 2028. Average intersection delays on Route 1 at Washington Road would increase from the existing 0.4 to 2.1 minutes to 3.0 to 5.9 minutes in 2028. Route 1 delays at Harrison Street would increase from the existing 0.8 to 1.9 minutes to 3.0 to 7.8 minutes in 2028. Travel time on Route 1 between Carnegie Center Boulevard in West Windsor Township and Scudders Mill Road in Plainsboro Township would exceed 15 minutes in the peak direction of travel in both the AM (northbound) and PM (southbound) peak hour, up from approximately five minutes today. In addition, severe delays are anticipated at the intersections of east-west routes crossing Route 1 in the Penns Neck area. Travel delays crossing Route 1 at Washington Road would increase from the existing 2.4 to 5.0 minutes to more than 16 minutes in 2028. Travel delays on Harrison Street approaching Route 1 would increase from the existing 1.4 to 8.2 minutes to more than 16 minutes in 2028.

These conditions would adversely effect east-west mobility. Average east-west travel times between Clarksville Road in West Windsor Township and Nassau Street in the vicinity of Alexander Road, Washington Road and Harrison Street in Princeton Borough would range from 18 to more than 21 minutes, up from 10 to 13 minutes today.

A more detailed description of the project purpose and need is presented in Chapter 1.

PROJECT GOALS

The following goals were developed based on public input received during the EIS scoping process and with significant input from the Partners' Roundtable Advisory Committee:

- For all modes of transportation, improve access, mobility and safety and reduce congestion.
- Protect and enhance the environment and natural resources.
- Protect and enhance natural areas, parks and open space.
- Protect and enhance historic and archeological resources.
- Protect and enhance the integrity of residential neighborhoods.
- Maintain the viability of institutional and business communities
- Recognize the interrelationships between land use and transportation.
- Provide an open, inclusive, transparent and responsive EIS process.
- Provide a proactive, comprehensive and ongoing public participation program.

A complete list of project goals and objectives is presented in Chapter 1.

ACTIONS CONSIDERED

The Penns Neck Area EIS considered a wide range of potential actions to meet the project purpose and address the project goals and objectives. This section describes the range of actions considered and indicates which actions were advanced for analysis in the EIS. Table ES-2 summarizes the actions considered and the disposition of each action. A complete summary of the actions considered appears in Chapter 2.

Table ES-2
Summary of Actions Considered in EIS

Action Considered	Disposition
No-Action	As required by the National Environmental Policy Act (NEPA), the Penns Neck Area EIS includes consideration of a No-Action Alternative. This "do-nothing alternative" is included as the benchmark alternative against which all "action" alternatives will be compared.
Travel Demand Management	A variety of TDM strategies were advanced as complementary strategies included in the proposed EIS Commute Options package incorporated as a part of each action alternative (see Chapter 2, Section 2.4).
Transit – Creation of a Light Rail Transit or Bus Rapid Transit system	This action was examined as part of a concurrent planning study conducted by the Delaware Valley Regional Planning Commission for the Central Jersey Transportation Forum (CJTF) and in partnership with NJ TRANSIT. The study determined that construction of a LRT/BRT system would not significantly improve traffic congestion in the Penns Neck area. This action was eliminated from further analysis in the Penns Neck Area EIS.
Transit – Changes to the NJ TRANSIT rail service	A variety of rail service changes were considered, including more frequent reverse peak service to Princeton Junction station; new rail stations in Plainsboro and/or South Brunswick; additional Amtrak commuter rail service to the Hamilton station; and changes to the Dinky service between Princeton Junction and Princeton Borough. Based on input from NJ TRANSIT, it was determined that these actions were either under investigation as part of other concurrent studies or the project purpose could be more efficiently addressed through enhanced/expanded use of shuttles/jitneys.
Transit – Modification to existing bus services and the creation of a comprehensive jitney/shuttle system	These actions were advanced as complementary strategies included in the proposed EIS Commute Options package incorporated as a part of each action alternative.
Various road-based capacity improvements	A variety of road-based actions were advanced for further consideration in the alternatives development process. In most cases, individual road-based actions were combined into the alternatives considered in the EIS. Chapter 2 provides a complete description of the alternatives development process.

DESCRIPTION OF ALTERNATIVES

Nineteen action alternatives and the No-Action Alternative are considered in the EIS. The alternatives are presented in seven groupings, lettered A-G, and are best understood based on the components included in each. A narrative description and comparative matrix (Table ES-3) of the major components and distinguishing features of each alternative is presented below. Chapter 2 includes maps and detailed descriptions of the physical and circulation characteristics of the 19 alternatives.

Major Components and Distinguishing Features

Route 1 at-grade

This component would maintain Route 1 at its existing grade in the Penns Neck area with three travel lanes in each direction and safety shoulders. Under some alternatives, Route 1 would remain on its existing alignment. In others, the alignment of Route 1 would shift slightly to the west. Under most alternatives, the Penns Neck area traffic signals would be removed. Finally, under all of the alternatives that include this component, the Route 1 bridge over the Millstone River would be replaced.

Route 1 in-a-cut

This component would place Route 1 below grade at Washington Road and shift its alignment slightly to the west. Washington Road would remain at its existing grade and remain open to east-west traffic. Route 1 would consist of three travel lanes in each direction, auxiliary lanes, as needed, and safety shoulders. In addition, the Route 1 bridge over the Millstone River would be replaced under all of the alternatives that include this component.

Frontage Roads

This component would include the construction of either two one-way frontage roads running parallel to Route 1 between Harrison Street and Washington Road on the east and west sides of Route 1, or one two-way frontage road running parallel to Route 1 on the west side. The frontage roads would collect traffic from the local roadway network and filter it onto the highway with Route 1 at-grade or in-a-cut.

East-side Connector (ESC) Road

This component would include the construction of a connector road east of Route 1 between CR 571 in Princeton Junction and a new grade-separated interchange on Route 1 located between Harrison Street and Fisher Place. The connector road would traverse the Sarnoff property. There are three potential ESC road alignments:

- **ESC 1** – This alignment would run along the northerly edge of the Sarnoff property adjacent to the Millstone River.
- **ESC 2** – This alignment would run parallel to but south of ESC 1 in the vicinity of the northerly circulation road included on the approved Sarnoff General Development Plan.
- **ESC 3** – This alignment would run along the southerly edge of the Sarnoff property in the vicinity of the southerly circulation road included on the approved Sarnoff General Development Plan. This alignment is adjacent to the Penns Neck neighborhood.

For the purpose of environmental and traffic analyses, the ESC road was analyzed as a 4-lane roadway that includes two 11-foot travel lanes in each direction, a 5-foot shoulder striped as a bicycle lane, and a 10-foot landscaped median. This cross-section represents a "worst-case" environmental footprint.

West-side Connector (WSC) Road

This component would include the construction of a connector road west of Route 1 between a new grade-separated interchange on Route 1 and Harrison Street, Washington Road or both. Some alternatives would also provide a connector road between Washington Road and Alexander Road on an alignment that connects with Canal Pointe Boulevard. All WSC roads would include one 11-foot travel lane with a 4-foot shoulder striped as a bicycle lane in each direction.

Vaughn Drive Connector (VDC) Road

This component would extend existing Vaughn Drive north from its current terminus in the Princeton Junction train station parking lot to Washington Road (County Route 571) in the vicinity of the NEC rail line bridge in Princeton Junction. The road would include one 11-foot travel lane and an eight-foot shoulder striped as a bicycle lane in each direction and a 10-foot landscaped median in some segments. There are three potential VDC road alignments:

- **VDC 1** - This easternmost alignment would parallel the NEC rail line and use the right-of-way of existing Station Drive and parking lot circulation roads. It would require a new at-grade crossing of the Dinky rail line or reconfiguration of the Princeton Junction/Dinky station operations.

- **VDC 2** – This alignment would be located just west of the Princeton Junction Train Station and would traverse a small office complex adjacent to Station Drive and station parking lots before connecting with existing Vaughn Drive. The alignment would utilize the existing at-grade crossing of the Dinky rail line, which connects station area parking lots.

- **VDC 3** – Located west of VDC 2, this alignment would use an existing driveway between two small office complexes and would travel through station parking lots before connecting with existing Vaughn Drive. This alignment would utilize the existing at-grade crossing of the Dinky rail line, which connects station area parking lots.

Table ES-3
Components of Alternatives

	Route 1 in-a-cut	Route 1 at-grade	Eastern frontage road	Western frontage road	East-side connector road	West-side connector road to Harrison St (Direct)	West-side connector road to Harrison St (Indirect)	West-side connector road to Washington Rd	West-side connector road between Alex. Rd and Washington Rd	Loop-type interchange (vicinity of Harrison)	Diamond interchange (vicinity of Harrison)	Diamond interchange (just north of Fisher Pl)	Vaughn Drive connector road
Alternative A	■				ESC1	■				■			■
A.1	■		■	■	ESC1	■				■			■
A.2	■			■	ESC1	■				■			■
A.3	■		■	■	ESC1	■					■		■
A.4	■		■	■	ESC1	■					■		■
Alternative B		■			ESC1		■	■		■			
B.1		■			ESC1		■	■		■			■
B.2		■			ESC1		■	■	■	■			■
Alternative C		■		2-way			■		■		■		■
C.1		■		2-way			■				■		■
Alternative D	■		■	■	ESC2	■					■		■
D.1	■		■	■	ESC2		■				■		■
D.2	■		■	■		■					■		■
Alternative E	■		■	■	ESC3		■					■	■
Alternative F	■				ESC1	■				■			■
F.1	■		■	■	ESC1	■				■			■
Alternative G		■											■
G.1		■											■
G.2		■											

Key: 2-way – frontage road accommodates two-way traffic.
ESC1 – northern alignment of the east-side connector road adjacent to Millstone River
ESC2 – central alignment of the east-side connector road
ESC3 – southern alignment of the east-side connector road adjacent to Penns Neck neighborhood

Potential traffic and circulation impacts

This section provides an overview of potential impacts to traffic and circulation patterns from the alternatives. Detail regarding all of the performance measures and data used in the traffic analyses is presented in Chapter 4, section 4.1. A detailed evaluation of the alternatives in relation to the project purpose and project goals and objectives is presented in Chapter 5.

Each of the alternatives was assessed based on a variety of transportation performance measures, based on a planning horizon year of 2028. **Unless otherwise noted, future (2028) traffic conditions under the action alternatives were compared to future (2028) conditions under the No-Action Alternative.** In most cases, the period of comparison is the AM peak hour. The study area for the traffic analyses is generally bounded by Plainsboro Road and Mapleton Road to the north, Alexander Road to the south, Clarksville Road to the east and Nassau Street to the west.

Summary of conditions under the No-Action Alternative

By 2028, traffic on Route 1 is expected to grow significantly, with the largest growth destined for West Windsor and Plainsboro and points north of the Penns Neck area. AM peak hour traffic on Route 1 between Harrison Street and Washington Road is expected to grow 25% in the northbound peak direction and 33% in the southbound direction. The directional flow of traffic on several segments of east-west roads is also noteworthy. Disproportionate growth in AM peak hour traffic will occur on Alexander Road east of Route 1 in the eastbound direction (+103%), Alexander Road west of Route 1 in the westbound direction (+54%), Washington Road west of Route 1 in the eastbound direction (+157%), and Harrison Street in the eastbound direction (+88%). These changes in directional flow underscore the enlarged role that residential areas located outside of the PSA will play as future labor markets for jobs located in and near the core study area.

System-wide traffic congestion, as measured by Vehicle Hours Traveled (VHT), VHT under congested conditions and Vehicle Miles Traveled (VMT) under congested conditions would increase significantly compared to the base year. VHT on study area roadways would increase from approximately 7,390 in the base year to 18,060 in 2028, an increase of approximately 145%. VHT under congested conditions would increase from approximately 3,070 to 16,840 an increase of 450%, and VMT under congested conditions would increase from a low base of approximately 1,930 to 31,220, an increase of 1500%.

Travel conditions in the PSA would deteriorate substantially under the No-Action Alternative according to a number of measures. AM peak hour travel time northbound (peak direction) on the 2.4 mile segment of Route 1 through the study area would increase from an existing average travel time of 5 minutes to greater than 15 minutes. AM peak hour travel time southbound would increase from an existing 4 minutes to approximately 7 minutes. Average intersection delays crossing Route 1 at Washington Road and Harrison Street would increase from an existing 3 to 4 minutes to more than 16 minutes in 2028. Average east-west travel times between the intersection of CR571 and Clarksville Road in West Windsor Township and Nassau Street in Princeton Borough, an average distance of approximately 3.6 miles, would increase from an existing 10 to 13 minutes to between 18 and 21 minutes by 2028. This represents an 80% increase.

Under the No-Action Alternative, the distribution of two-way traffic on Alexander Road, Washington Road and Harrison Street west of Faculty Road will shift from Alexander Road and Harrison Street to Washington Road. At the same time, the distribution of two-way traffic between the NEC rail line and Route 1 would shift from Alexander Road to Washington Road. Traffic volumes on virtually all core area roadways would increase significantly.

The proportion of heavy trucks using Alexander Road as a percentage of total daily traffic would increase from 3% under existing conditions to 5.4% under the No-Action Alternative. The proportion of heavy trucks using Washington Road would increase from 2.1% under existing conditions to 3.9%, and the proportion of heavy trucks using Harrison Street would increase from 4.2% under existing conditions to 6.6% of total daily traffic under the No-Action Alternative.

Travel delay and growth in congestion
The EIS traffic analyses found that all of the action alternatives, except the No-Action and the G-series alternatives, provided significant public benefit in terms of system-wide congestion relief in the Penns Neck area. Based on the traffic analyses, it appears that unrestricted flow of traffic on Route 1, combined with at least one grade-separated interchange north of Alexander Road, and an east-side connector (ESC) road, are critical components with regard to reducing area-wide travel delay and growth in congestion. The F-series alternatives, which would include Route 1 in-a-cut, a grade-separated loop-type interchange at Harrison Street, an ESC road, and a VDC road, provided the most relief, while the C and G-series alternatives and Alternatives D.2 (Route 1 in-a-cut and no ESC road) provided the least reduction in area-wide congestion.

North-south travel time
North-south travel time was simulated along Route 1 between Scudders Mill Road in Plainsboro and Carnegie Center Blvd in West Windsor. An important component of the alternatives relative to improving the flow of traffic on Route 1 is the elimination of the Penns Neck area traffic signals. The traffic analyses indicate that all of the action alternatives except G.2 would improve flow of traffic on Route 1. Travel time savings range from 4-43%. The C-series alternatives which limit access to Route 1 are the best performers, while the G-series are the worst performers.

East-west travel time
East-west travel time was simulated between the intersection of Clarksville Road in West Windsor and three points along Nassau Street in Princeton. Those alternatives that include a grade-separated crossing of Route 1 at both Washington Road and Harrison Street are the best performers. All of the action alternatives except C.1 and G.2 reduce east-west travel time. Reductions range from 3-31%. The G-series alternatives perform the worst.

Intersection delays crossing Route 1
Closely related to improving the flow of traffic on east-west routes is reducing intersection delays when crossing Route 1. All of the action alternatives except the G-series alternatives significantly reduce intersection delays crossing Route 1 at Washington Road and Harrison Street, where through movement is permitted. Intersection delays at Washington Road and

Harrison Street are reduced from an estimated 16 plus minutes under the No-Action Alternative to 1 minute or less under the action alternatives that include grade-separated through movement of east-west traffic across Route 1. Intersection delays crossing Route 1 at Alexander Road are largely unaffected by the alternatives.

Balance of traffic on east-west routes

The distribution of traffic on east-west routes on both sides of Route 1 was considered at two locations. It is important to note that the distribution of traffic will change over time, with or without improvements in the Penns Neck area. As shown in Table ES-4, Alternatives C, C.1, G and G.1 would provide the least variation in distribution compared to the No-Action Alternative. Alternative B.2 would provide the most equal distribution of traffic into and out of Princeton. On the east side of Route 1, those alternatives that include an ESC road would shift a significant portion of east-west traffic off of Washington Road in the Penns Neck neighborhood onto the ESC road.

Table ES-4
Distribution of Traffic on East-west Routes

		Existing	No-Action	A	A.1	A.2	A.3	A.4	B	B.1	B.2
Location 1 - Distribution of traffic west of Faculty Road (% of total 2-way E-W traffic - AM peak hour)											
Alexander Rd		45%	40%	39%	40%	39%	39%	38%	40%	39%	37%
Washington Rd		32%	37%	31%	32%	31%	32%	32%	33%	35%	35%
Harrison St		23%	22%	30%	28%	29%	30%	30%	27%	26%	28%
Location 2 - Distribution of traffic b/w NEC rail line and Route 1 (% of total 2-way E-W traffic - AM peak											
Alexander Rd		59%	49%	39%	40%	40%	39%	40%	38%	41%	40%
Washington Rd		41%	51%	17%	16%	16%	16%	13%	11%	13%	9%
East-side connector (ESC) road		N/A	N/A	44%	44%	44%	46%	47%	51%	46%	51%
	C *	C.1 *	D	D.1	D.2*	E	F	F.1	G *	G.1 *	G.2 *
Location 1 - Distribution of traffic west of Faculty Road (% of total 2-way E-W traffic - AM peak hour)											
Alexander Rd	41%	44%	39%	40%	40%	38%	39%	38%	39%	39%	44%
Washington Rd	36%	32%	32%	33%	32%	34%	29%	30%	36%	36%	29%
Harrison St	23%	23%	29%	27%	28%	28%	32%	32%	25%	25%	27%
Location 2 - Distribution of traffic b/w NEC rail line and Route 1 (% of total 2-way E-W traffic - AM peak											
Alexander Rd	63%	63%	43%	44%	56%	44%	37%	37%	59%	59%	61%
Washington Rd	37%	37%	9%	9%	44%	8%	15%	13%	41%	41%	39%
East-side connector (ESC) road	N/A	N/A	47%	47%	N/A	48%	48%	50%	N/A	N/A	N/A

* Assumes constrained development on the Sarnoff property

Change in local traffic patterns (residential and mixed use streets)
Change in local traffic patterns was assessed based on the degree to which traffic increased or decreased in comparison to the No-Action Alternative. For comparison purposes, key roadway segments were selected and grouped into three generalized geographic areas: a) the core area between the D&R Canal and the NEC rail line; b) west of the D&R Canal; and c) the vicinity of the NEC rail line. For the purposes of this summary, traffic changes on mixed use and residential streets located in the core study area are summarized below.

In the core area between the NEC rail line and the D&R Canal,

- All Action Alternatives except G, G.1 and D.2 would reduce traffic on **Washington Road in Penns Neck** from 25% to 80%. Alternative D.2 would reduce traffic 9% and Alternatives G and G.1 would increase traffic marginally (2%).
- All Action Alternatives except C.1 and G.2 would decrease traffic on **Alexander Road between the D&R Canal and Route 1** from 5% to 17%. Alternatives C.1 and G.2 would increase traffic on this segment of Alexander Road.
- All Action Alternatives except the C and G-series would decrease traffic on **Lower Harrison Street** between Route 1 and the D&R Canal more than 95%. The C-series alternatives would increase traffic approximately 10% and the G-series alternatives would increase traffic 32% to 41%.

West of the D&R Canal,

- All Action Alternatives except C.1 would reduce traffic on **Alexander Road between University Place and Mercer Street** up to 17%.
- All alternatives except G and G.1 would decrease traffic on **Nassau Street between Washington Rd and Harrison Street** from 7% to 23%. Alternatives G and G.1 would increase traffic 5%.
- All Action Alternatives except the C-series would increase traffic on **Upper Harrison Street between Faculty Road and Nassau Street** from 14% to 37%. The C-series alternatives would not change traffic compared to the No-Action Alternative.

In the vicinity of the NEC rail line:

- All Action Alternatives would decrease traffic on **Alexander Road between CR 571 and Wallace Road** from 3% to 31%.
- All alternatives except B and the G series would decrease traffic on **Wallace Road** from 11% to 43%. Alternative B would increase traffic 20% and the G-series alternatives would increase traffic 4% to 38%.
- All Action Alternatives except G and G.1 would decrease traffic on **North Post Road** from 2% to 24%. Alternatives G and G.1 would increase traffic 4%.
- All of the alternatives except B, B.1 and the G-series would be neutral or would reduce traffic on **Clarksville Road between No. Post Road and CR 571** up to 7%. Alternatives B, B.1 and the G-series alternatives would increase traffic 5% to 19%.
- All Action Alternatives would be neutral or would reduce traffic on **CR 571 between Alexander Road and Wallace Road** up to 25%.
- All Action Alternatives except B, D.2 and G.2 would increase traffic on **Bear Brook Road** 2% to 19%. Alternatives D.2 and G.2 would be neutral. Alternatives B and G.2 would reduce traffic 11%.

Truck traffic on east-west streets
Under all alternatives, trucks would represent less than 7% of total daily traffic using east-west routes. Compared to the No-Action Alternative, the overall change in heavy trucks using east-west streets would be less than 2%.

Non-auto travel modes
All of the action alternatives would be accompanied by concurrent implementation of a "Commute Options" package which would include complementary travel demand management strategies, transit service enhancements and pedestrian and bicycle improvements. A detailed description of the proposed Commute Options package is presented in Chapter 2, section 2.4.

Access Management
All of the alternatives, except the No-Action and G-series alternatives, would manage access and safety better along Route 1 in the Penns Neck area by eliminating some or all curb-cuts along Route 1 between Harrison Street and Alexander Road. In addition, the A, C, D, E and F-series alternatives would use a system of frontage roads which would separate regional and local traffic.

POTENTIAL IMPACTS TO THE NATURAL ENVIRONMENT

This section provides an overview of potential impacts to the natural environment. Detail regarding all of the performance measures and data used in the assessment of impacts is presented in Chapter 4. A detailed evaluation of the alternatives in relation to the project purpose and all of the project goals and objectives is presented in Chapter 5.

A variety of objectives/performance measures were used to assess potential impacts to the natural environment. Only direct impacts resulting from the proposed alternatives are considered in this section. In most cases, the impacts relate to the permanent physical disturbances caused by the proposed alternative alignments. Potential secondary and cumulative effects are summarized in a separate section below.

Wetlands, floodplains and groundwater recharge
Wetlands, floodplains and groundwater recharge in the project area would be affected to a limited degree by the action alternatives. All of the action alternatives would permanently impact wetlands; however, in all cases, impacts would be less than ½ acre (see Table ES-5). This represents a very small percentage of the total 245 acres of wetlands located within the project area. There are approximately 820 acres of floodplains located in the project area. As shown in Table ES-5, the action alternatives would result in the permanent disturbance of 0.63 acres to 4.1 acres of floodplains. This represents less that a 1% reduction in project area floodplains. The action alternatives would also introduce approximately 3 to 33 acres of new road-related impervious surface to the project area. This new impervious surface would reduce the capacity of the project area to recharge groundwater by less than 2%.

Table ES-5
Potential Wetland and Floodplain Impacts

Alternative	Potential wetlands disturbance (acres)	Percent of project area wetlands effected	Potential floodplains disturbance (acres)	Percent of project area floodplains effected
A	0.29	0.12%	3.58	0.44%
A.1	0.29	0.12%	3.51	0.43%
A.2	0.29	0.12%	3.58	0.44%
A.3	0.29	0.12%	3.92	0.48%
A.4	0.29	0.12%	3.92	0.48%
B	0.31	0.13%	4.10	0.50%
B.1	0.31	0.13%	4.10	0.50%
B.2	0.31	0.13%	3.98	0.48%
C	0.06	0.02%	0.72	0.09%
C.1	0.06	0.02%	0.72	0.09%
D	0.19	0.08%	3.60	0.44%
D.1	0.19	0.08%	3.58	0.44%
D.2	0.08	0.02%	1.22	0.14%
E	0.17	0.07%	3.15	0.38%
F	0.29	0.12%	3.94	0.48%
F.1	0.29	0.12%	3.94	0.48%
G	0.10	0.04%	0.98	0.12%
G.1	0.10	0.04%	1.02	0.12%
G.2	0.10	0.04%	0.63	0%

Note: Values exclude VDCs.

Habitat fragmentation

The A, B and F-series alternatives and Alternatives E, D and D.1 would include an ESC road. The ESC road would bisect and fragment the Little Bear Brook wetland corridor and adjacent upland forest located east of Route 1 on the Sarnoff property. This area provides comparatively high quality wildlife habitat. The C and G-series alternatives and Alternative D.2, which would not include an ESC road, are not likely to result in the fragmentation of high quality wildlife habitat.

Threatened and endangered species

In accordance with federal procedures for the preparation of EIS documents, the US Fish and Wildlife Service, New Jersey Department of Environmental Protection – Endangered and Nongame Species Program and the NJ Audubon Society were consulted to determine if any Federal or State threatened and endangered species were known to be located in the project area. According to the US Fish and Wildlife Service, "...except for an occasional transient Bald Eagle, no other federally listed or proposed endangered or threatened species are known to occur within the vicinity of the proposed project site." Officials acknowledged that there has been an increase in the number of Bald Eagle sightings and stated that this is consistent with the increase in the

nesting and wintering Bald Eagle population in New Jersey that has occurred over the past two decades.

According to officials from the DEP Endangered and Nongame Species Program and NJ Audubon Society, there are no known nesting pairs of Bald Eagles in Mercer County. In addition, these officials advised that if there were a Bald Eagle nest in the vicinity of Carnegie Lake, given the nature of human activity in the area, the Endangered and Non-game Species Program would be aware of such an occurrence. Based on this consultation, it appears that the action alternatives would not impact any federally listed or proposed threatened or endangered species or identified critical habitat for federal threatened or endangered species.

During the course of this study, a Long-eared Owl has been reported and documented as present in the forested area of the Sarnoff property adjacent to the Little Bear Brook. The Long-eared Owl is on the State threatened species list. Those alternatives that include an ESC road may impact the habitat of the Long-eared Owl. Consultation with DEP on this potential impact is ongoing, and if additional investigation is necessary, it will be pursued during the preparation of the Final Environmental Impact Statement.

Water quality

Those alternatives that include an ESC road would introduce a new road running parallel to the Millstone River and a new crossing of the Little Bear Brook. All of these alternatives would maintain at least a 100-foot buffer from the 100-year flood plain. This is consistent with guidelines for recommended buffer widths. In addition, the alternatives that include an ESC road would meet stream corridor buffer performance criteria for stream crossing angle, elevation and frequency.

With the exception of the Route 1/Alexander Road interchange, presently, there are no stormwater management facilities in place to control the quality of stormwater runoff from existing Alexander Road, Washington Road and Harrison Street. Because there is a relationship between the level of traffic using a road and the level of pollutants in stormwater runoff from a road, change in traffic on these streets was examined as a means of considering potential pollution impacts from existing roads. All of the action alternatives except the C and G-series alternatives would reduce traffic on some segments of existing east-west streets and, therefore, provide an opportunity to reduce the level of pollutants in runoff from existing roads.

Future pollutant levels in stormwater runoff from new roads were estimated using procedures prescribed by the Federal Highway Administration. Based on this analysis, it appears that all of the action alternatives would result in post-discharge pollutant concentrations that meet State Surface Water Quality Standards for ***Suspended Solids, Total Nitrate, Chloride, Lead, Cadmium, and Chromium***. All of the action alternatives except the G-series alternatives would result in pollutant concentrations that approach or exceed standards for ***Total Phosphorous***. Although this analysis indicates that a potential exceedence of water quality standards for phosphorus may occur, it should also be noted that construction of any of the action alternatives would be subject to a permitting process governed by statutes and regulations intended to protect water quality and to prevent potential violations of water quality standards.

This would include construction of stormwater management facilities that would further treat roadway runoff prior to discharge to receiving waterbodies.

Air quality

Potential localized air quality impacts from the alternatives were analyzed in accordance with Federal Highway Administration and USEPA guidance and regulations. An intersection "hot spot" analysis for carbon monoxide was conducted. The analyses indicated that all of the alternatives, including the No-Action Alternative, would comply with the federal air quality standard for Carbon Monoxide.

Underlying geology

The A and F-series alternatives and Alternatives E and D.1, which include Route 1 in-a-cut, would require the excavation and removal of approximately 48,000 cubic yards of rock material. Alternatives D and D.2, which would include Route 1 in-a-cut and an extended cut-and-cover section, would require the removal of approximately two times that amount or approximately 88,000 cubic yards of rock. The B, C and G-series alternatives would not impact underlying geology. Preliminary geotechnical borings along Route 1 suggest that rock conditions would not require blasting. Rock removal can be undertaken for Route 1 in-a-cut using typical excavation methods.

POTENTIAL IMPACTS TO THE BUILT ENVIRONMENT

This section provides an overview of potential impacts to the built environment. Detail regarding all of the performance measures and data used in the assessment of impacts is presented in Chapter 4. A detailed evaluation of the alternatives in relation to the project purpose and all of the project goals and objectives is presented in Chapter 5.

A variety of objectives/performance measures were used to assess potential impacts to the built environment. In most cases, both direct and indirect impacts resulting from the proposed alternatives are considered in this section. Potential secondary and cumulative effects are summarized in a separate section below.

Cultural Resources

For the purposes of the EIS, potential impacts to archeological and historic architectural resources that are listed or eligible for listing on the National Register of Historic Places were assessed. There are 4 archeological sites and 13 historic architectural resources located in the project area that qualify under this category. These include:

Archeological resources:

- 28ME2 – This site is located in the vicinity of the Harrison St/Route 1 intersection on the east side of Route 1. It contains artifacts indicating prehistoric occupations dating to the Late Archaic, Terminal Archaic and Woodland periods.
- 28ME23 – This site is located in the vicinity of the proposed east-side connector road crossing of the Little Bear Brook on the east side of the brook. It contains artifacts indicating prehistoric occupations dating to the Late Archaic and Late Woodland periods.

- 28ME86 – This site is located in the vicinity of the proposed east-side connector road crossing of the Little Bear Brook on the west side of the brook. It contains artifacts indicating prehistoric occupations dating to the Late Archaic, Middle Woodland and Late Woodland periods.
- 28ME291 – This site is located in the vicinity of the Vaughn Drive connector road interchange with CR571/Washington Rd. It is a small but intact deposit dating to the Early Woodland period.

Historic architectural resources:

- Aqueduct Mills Historic District
- Aqueduct Mills Historic District Extension
- Covenhoven-Logan-Silvers House
- Delaware & Raritan Canal Bridge
- Delaware & Raritan Canal Historic District
- Lake Carnegie Historic District
- Penns Neck Baptist Church (a.k.a. – Princeton Baptist Church at Penns Neck)
- Penns Neck Cemetery
- Pennsylvania Railroad Historic District
- Princeton Operating Station (a.k.a. – Eden Institute)
- Sarnoff Corporation (formerly RCA Laboratories – David Sarnoff Research Center)
- David S. Voorhees House
- Washington Road Elm Allée

As shown in Table ES-6, all of the action alternatives have the potential for multiple impacts to a variety of resources. All of the action alternatives would include a widening of Route 1 in the vicinity of Mapleton Road to accommodate the construction of safety shoulders and/or auxiliary lanes. This widening would result in the physical disturbance and/or destruction of a dry-laid stone wall immediately adjacent to the southbound lanes of Route 1. This stone wall is a contributing resource to the ***Aqueduct Mills Historic District***. In addition, those alternatives that include Route 1 in-a-cut would result in a temporary noise impact to the ***Penns Neck Baptist Church***. This noise impact would be associated with excavation activities related to constructing Route 1 in-a-cut. The long-term impact of Route 1 in-a-cut relative to the Penns Neck Baptist Church is expected to be positive.

Those alternatives that include an ESC road would have the most impact on archeological resources. ESC 1 and ESC 2 would result in the physical disturbance and/or destruction of a portion of 3 archeological sites. ESC 3 would result in the physical disturbance and/or destruction of a portion of 2 archeological sites.

The direct WSC road to Harrison Street associated with the A, B, and F-series alternatives would result in both positive and negative impacts on the ***Aqueduct Mills Historic District Extension***. It is likely that portions of the road would be visible from parts of the district; however, the inclusion of the WSC road parallel to Lower Harrison Street would reduce traffic on the portion of Harrison Street traversing the district. The net impact of these changes is expected to be positive. The direct WSC road to Harrison Street associated with Alternative D and D.2 would

result in less traffic on Lower Harrison Street in the ***Aqueduct Mills Historic District Extension***, and given the location of the proposed road, no visual intrusion on the district would occur.

The indirect WSC road to Harrison Street associated with Alternative D.1, which would intersect Lower Harrison Street in the vicinity of Eden Way/Logan Drive, would result in increased traffic, noise and visual intrusion north and west of the intersection. The indirect WSC road to Harrison Street associated with Alternative E would reduce traffic on Lower Harrison Street in the ***Aqueduct Mills Historic District Extension***, and given the location of the proposed road, no visual intrusion on the district would occur.

The direct WSC road to Harrison Street associated with the A, B, D and the F-series alternatives and the indirect WSC road to Harrison Street associated with Alternatives D.1 and E would result in increased traffic, noise and visual intrusion proximate to the ***Covenhoven-Logan-Silvers House.***

The WSC road between Route 1, Harrison Street and Washington Road associated with Alternatives B and B.1 would be located within 350 feet of the D&R Canal at its closest point. The road would be visible from a portion of the ***Delaware & Raritan Canal Historic District.*** This increased visual intrusion would result in a negative impact on the district.

The WSC road between Route 1, Harrison Street and Washington Road associated with the B-series alternatives and the WSC road between Washington Road and Alexander Road associated with Alternative B.2 and C would result in physical disturbance and/or physical destruction of one or more trees associated with the ***Washington Road Elm Allée.***

The diamond and loop-type interchanges in the vicinity of Harrison Street associated with the A, B, C and F-series alternatives would result in the physical disturbance/destruction of a portion of 1 archeological site. In addition, the interchanges would result in the physical disturbance and/or destruction of the ***Covenhoven-Logan-Silvers House*** and ***Princeton Operating Station.***

VDC 1 would result in the physical disturbance and/or destruction of the Princeton Junction Hotel, a contributing resource of the ***Pennsylvania Railroad Historic District*** and would also result in partial acquisition of the property associated with the ***David S. Voorhees House.*** VDC 2 would not impact any National Register listed or eligible historic resources. VDC 3 would result in the physical disturbance and/or destruction of 1 archeological site.

Table ES-6
Potential Impacts to National Register Listed or Eligible Resources

Alternative	Number of archeological sites impacted	Number of historic architectural sites impacted
A	3	6
A.1	3	6
A.2	3	6
A.3	3	6
A.4	3	6
B	3	6
B.1	3	6
B.2	3	6
C	1	5
C.1	1	4
D	3	5
D.1	3	6
D.2	0	4
E	2	5
F	3	6
F.1	3	6
G	0	3
G.1	0	5
G.2	0	3
VDC1	0	2
VDC2	0	0
VDC3	1	0

A detailed description of potential impacts to cultural resources is presented in Chapter 4.

Distinctive neighborhoods

The No-Action Alternative would result in no physical fragmentation of neighborhoods or residential displacement; however, under the No-Action Alternative, traffic on existing roadways is expected to increase substantially throughout the study area. A number of neighborhoods may experience increased visual and auditory intrusion resulting from increases in traffic. Notably, AM peak hour traffic on Washington Road bisecting the Penns Neck neighborhood would increase from approximately 1610 vehicles today to 2670 in 2028, an increase of 66%. AM peak hour traffic on Alexander Road bisecting the Berrien City neighborhood would increase from approximately 610 vehicles today to 1565 vehicles in 2028, a 157% increase.

All of the action alternatives would avoid physical fragmentation of residential neighborhoods; however, as noted below, a number of neighborhoods may experience increased visual and auditory intrusion resulting from increase traffic. As noted in Chapter 3, a number of distinctive

mixed use areas and residential neighborhoods were identified within and adjacent to the study area. These include:

West Windsor Township

- Penns Neck;
- Princeton Junction, a mixed use, pedestrian-scaled area that includes the Princeton Junction business/shopping area, West Windsor's municipal complex, and the Berrien City, Sherbrooke Estates, Benford Estates, Clarksville Road, and Wellington Estates neighborhoods;
- Lower Harrison Street;
- Alexander Road (west of Route 1);
- Canal Pointe; and
- Old Bear Brook Road and Windsor Haven.

Princeton Borough & Township

- Central District, a mixed use, pedestrian-scaled area that includes the Princeton Borough CBD and the Bank Street historic district;
- Mercer Hill; and
- Upper Harrison Street, which includes the Jugtown historic district.

The action alternatives would result in the following traffic-related impacts to neighborhoods:

- All of the action alternatives except G.2 would be neutral or have a positive impact on the **residences and neighborhoods located along Alexander Road** between Route 1 and the D&R Canal.
- All of the action alternatives except B, D.2 and G.2 would have a negative impact on residences located along **Bear Brook Road and the Windsor Haven** neighborhood.
- All of the action alternatives would be neutral or have a positive impact on the **Benford Estates** neighborhood.
- All of the action alternatives except B and G.2 would have a positive impact on the **Berrien City** neighborhood.
- All of the action alternatives except B.2 would be neutral or have a positive impact on the **Canal Pointe** neighborhood.
- All of the action alternatives except B and G.2 would be neutral or have a positive impact on **residences located along Clarksville Road and the Wellington Estates** neighborhood.
- All of the action alternatives except the C and G-series alternatives would have a positive impact on the **Lower Harrison Street** neighborhood.
- All of the action alternatives except E would be neutral or have a positive impact on the **Penns Neck** Neighborhood.
- All of the action alternatives would be neutral or have a positive impact on the **Sherbrooke Estates** neighborhood.

- All of the action alternatives except the C-series alternatives would have a negative effect on the **Upper Harrison Street** neighborhood, which includes the **Jugtown Historic District**. The C-series alternatives would be neutral.
- All of the action alternatives except C.1 would be neutral or have a positive effect on the **Mercer Hill Historic District**.
- All of the action alternatives except A, A.4, E, F.1, G and G.1 would be neutral or have a positive effect on **Princeton Borough's Central District** south of Washington Road, including the **Bank Street Historic District**.
- All of the action alternatives except G and G.1 would have positive effect on **Princeton Borough's Central District** north of Washington Road.

Residential displacements

The A and B-series alternatives, which include a loop-type interchange and WSC road in the vicinity of Harrison Street, would result in two residential displacements in the vicinity of Eden Way/Logan Drive. In addition, if combined with VDC 3, all of the action alternatives except B and G.2, would result in one residential displacement in the vicinity of Washington Road and Station Drive.

Schools and community facilities

All of the action alternatives except B and G.2 would at least partially enhance vehicular, bicycle and pedestrian access and safety to West Windsor's Maurice Hawk School and the West Windsor-Plainsboro High School (South Campus) located on Clarksville Road in West Windsor Township. All of the action alternatives, except B, F.1 and the G-series alternatives would enhance vehicular, bicycle and pedestrian access and safety to community facilities located within the West Windsor Township municipal complex. Alternatives B, F.1 and the G-series partially enhance access to the municipal complex.

Business and institutional communities

The No-Action Alternative would result in no business displacements or fragmentation of lands reserved for campus development; however, under the No-Action Alternative, area-wide congestion would result in lengthy north-south and east-west travel times, thereby limiting access to area businesses and institutions. All of the action alternatives except G.2 would result in multiple business displacements, including in most cases, the gas stations along Route 1 and in some cases Eden Institute. The B-series alternatives would result in the fewest displacements, while the A and F-series alternatives would result in the most displacements.

The A, F and G-series alternatives would minimize adverse impacts to future campus development on the Sarnoff property and Princeton University land west of Route 1. All of the action alternatives except the C and G-series alternatives would enhance vehicular access and safety to area businesses and institutions by reducing north-south and east-west travel time. Finally, all of the action alternatives would also enhance transit, bicycle and pedestrian access to area businesses and institutions through concurrent implementation of a "Commute Options" package.

Parks and recreational facilities

The No-Action Alternative would result in no physical changes that would affect natural areas, parks and recreational facilities; however, under the No-Action Alternative, increased traffic at the three crossings of the ***D&R Canal State Park*** would result in increased noise and visual intrusion on the park. All of the action alternatives except C.1 and G.2 would have a neutral or positive impact at the ***Alexander Road crossing of the Park*** and all of the action alternatives would have a neutral or positive impact at the ***Washington Road crossing***.

Alternatives B and B.1 would introduce a new road running parallel to the ***Canal between Washington Road and Harrison Street***. This road would introduce traffic-related noise and visual intrusion in an area of the park where it does not presently exist. This would have a significant negative impact on the use and enjoyment of the park.

All of the action alternatives would increase traffic-related visual and noise intrusion at the ***Harrison Street crossing***; however, the A, B, D, E and F-series alternatives provide an opportunity to enhance access and safety for motorists and park users at this location by improving sight distance at the crossing.

Alternative B.2 would negatively affect the use of athletic fields located on Princeton University-owned land west of Route 1; and Alternative E would impact the use of athletic fields located on the Sarnoff property.

Natural areas

As noted earlier, all of the action alternatives except the C and G-series alternatives and Alternative D.2 would introduce a new ESC road running parallel to the ***Millstone River east of the Little Bear Brook***. This road would introduce traffic-related noise and visual intrusion in an area of the river corridor where it does not presently exist. All of the action alternatives except the C and G-series alternatives and Alternative E would introduce a new road running parallel to the ***Millstone River west of the Little Bear Brook***. Alternatives D and D.1, which include the ESC road alignment 2 would provide additional distance from the river corridor west of the Devil's Brook. Finally, all of the action alternatives, except the C and G-series alternatives and Alternative D.2, would also introduce a new road crossing of the ***Little Bear Brook***, approximately 1400 feet from the existing Washington Road crossing.

Contaminated materials sites

All of the action alternatives except G.2 would result in the potential disturbance of multiple contaminated materials sites (see Table ES-7). Those sites that are disturbed would require clean-up and remediation in accordance with federal and state regulations.

Table ES-7
Potential Impacts to Contaminated Materials Sites

Alternative	Number of sites disturbed (Higher Concern)	Number of sites disturbed (Lower Concern)
A	5	5
A.1	5	5
A.2	5	5
A.3	5	5
A.4	5	5
B	1	5
B.1	1	5
B.2	1	5
C	3	2
C.1	3	2
D	6	4
D.1	6	4
D.2	5	2
E	5	4
F	5	5
F.1	5	5
G	2	1
G.1	4	1
G.2	0	1
VDC1	0	1
VDC2	0	2
VDC3	0	1

PRELIMINARY CONSTRUCTION COST ESTIMATES

Preliminary construction cost estimates were developed for each of the action alternatives. These cost estimates were based on NJDOT's *Construction Cost Estimation Preparation Manual for Preliminary Design*, July 2002. The construction cost estimate formulas are based on historical construction cost data for a range of project types. The estimation procedures incorporate the following elements of roadway construction:

1. Earthwork
2. Pavement
3. Culverts & bridges
4. Drainage
5. Utility relocation
6. Landscaping
7. General and incidental items.

Costs related to engineering design, right-of-way acquisition, contaminated materials remediation and other environmental mitigation costs are not included because of the project-specific nature of these items.

Table ES-8
Preliminary Construction Cost Estimates
(in 2006 dollars)

Alternative	Cost w/o VDC	Cost for VDC1	Cost with VDC1	Cost for VDC2/VDC3	Cost with VDC2/VDC3
A	$50,000,000	$10,000,000	$60,000,000	$5,000,000	$55,000,000
A.1	$52,000,000		$62,000,000		$57,000,000
A.2	$51,000,000		$61,000,000		$56,000,000
A.3	$54,000,000		$64,000,000		$59,000,000
A.4	$54,500,000		$64,500,000		$59,500,000
B	$36,500,000		N/A		N/A
B.1	$34,500,000		$44,500,000		$39,500,000
B.2	$42,500,000		$52,000,000		$47,500,000
C	$28,500,000		$38,500,000		$33,500,000
C.1	$22,500,000		$32,500,000		$27,500,000
D	$87,500,000		$97,500,000		$92,500,000
D.1	$60,000,000		$70,000,000		$65,000,000
D.2	$79,000,000		$89,000,000		$84,000,000
E	$51,500,000		$61,500,000		$56,500,000
F	$50,500,000		$60,000,000		$55,500,000
F.1	$53,500,000		$63,500,000		$58,500,000
G	$13,000,000		$23,000,000		$18,000,000
G.1	$14,000,000		$24,000,000		$19,000,000
G.2	$12,000,000		N/A		N/A

Shaded cells – Alternatives that include Route 1 in-a-cut

As shown in Table ES-8, the preliminary cost estimates for the action alternatives range from approximately $12 million for Alternative G.2 to $97.5 million for Alternative D, if it were constructed with VDC road alignment 1. The most significant factors affecting the construction costs include:

- the amount of proposed structure required;
- whether Route 1 would be constructed at-grade or in-a-cut;
- if a VDC road is included with an alternative and if so, which VDC alignment is selected; and,
- the amount of new roadway needed for an east-side connector road, west-side connector roads and/or frontage roads.

Table ES-9 presents estimates for select major components.

Table ES-9
Costs for select major components

Major Component	Cost Estimate
Route 1 in-a-cut	$18,000,000
Additional cost for cut-and-cover plaza included in Alternative D	$27,000,000
East-side connector (ESC) road	$8,000,000
Vaughn Drive Connector (VDC) road 1	$10,000,000
VDC 2/3	$5,000,000

ENVIRONMENTAL JUSTICE

Racial and ethnic minorities in the PSA and SSA comprise 31.5 percent and 27.3 percent, respectively. These are lower percentages than New Jersey's 34 percent, Mercer County's 35.8 percent, and Middlesex County's 38.1 percent. Within the PSA, Plainsboro had a higher percentage of minority persons than the state and study area counties, at 44.5 percent. In the PSA and SSA, Asian/Pacific Islander was the largest category of minority, followed by African Americans and Hispanics.

The minority and low-income populations represented in all but two of the Census Block Groups located within the core study area do not exceed fifty percent of the total population and are not materially greater than the proportion of minority or low-income populations represented in the PSA municipalities, surrounding counties, or New Jersey. The minority and low-income populations represented in Census Tract 41 – Block Group 2 located along Alexander Road in Princeton Borough, are 57% and 0% respectively. Although the minority population of this Block Group exceeds 50%, persons living in this Block Group are not expected to be disproportionately impacted. Compared to the No-Action Alternative, all of the action alternatives would be neutral or reduce traffic on Alexander Road adjacent to this area.

The minority and low-income populations represented in Census Tract 42.04 – Block Group 3, located in Princeton Township along Upper Harrison Street, are 30% and 12% respectively. Although the low-income population represented in this Block Group is comparatively higher than other areas, adverse impacts would not be disproportionately borne by low-income persons living in this Block Group. Potential impacts from increased traffic on Upper Harrison Street under all of the action alternatives except the C-series alternatives would not be more adverse to these persons than to non-low-income populations affected by the alternatives. The C-series alternatives would be neutral in terms of traffic-related impacts along Upper Harrison Street.

SECONDARY AND CUMULATIVE EFFECTS

Potential secondary and cumulative effects on the environment were assessed for the Action Alternatives. As required by the National Environmental Policy Act (NEPA) (40 CFR Part 1508.7), past, present and reasonably foreseeable future actions have been included in this secondary and cumulative effects analysis (SCEA). The SCEA was performed pursuant to 23 CFR Part 771 and the Council on Environmental Quality's guidelines contained in the document

entitled *Considering Cumulative Effects under the National Environmental Policy Act*, January 1997.

Secondary Effects

Secondary effects consist of the impacts that would occur as a result of growth induced by an Action Alternative. For instance, if a sewer line were proposed through land that is currently vacant, the impact of building a home that is now feasible due to installation of that sewer line would be considered a secondary effect. The home is dependent upon the sewer line. In the case of the actions considered in the EIS, if an Action Alternative enhances access to a particular undeveloped site, thus enabling development of that site, the development of the site after road construction would be considered a secondary effect.

The time frame of the secondary effects analysis is from completion of an Action Alternative (ETC) 2008 through Design Year 2028. This 20-year period is the design life of the project, which means the time period during which the project has been designed to be effective in terms of its purpose and need.

For those alternatives that include an ESC road, the EIS employment projections assume that market demand could result in an additional 1.2 million square feet of new office/research space and associated parking on the site by the Design Year 2028. Accordingly, total development on the site would be 1.8 million square feet or approximately 60% of the total space permitted under the GDP approval. The EIS employment projections assume that if an ESC road is not present, development on the Sarnoff site would be constrained to Phase I development which includes a total of 1.2 million square feet of office/research space. Because the provision for an ESC road in some Action Alternatives would enable the development of an additional 600,000 square feet of space by 2028 (total of 1.8 million square feet), this increment of development and its associated impacts would be considered secondary effects of those alternatives. Table ES-10 provides a brief summary of development potential on the Sarnoff site and associated traffic and impervious cover effects.

Table ES-10
Summary of Potential Secondary Effects

	Full Build-out	2028 w/o ESC	2028 w/ESC	Secondary Effect
Development (square feet)	3,000,000	1,200,000	1,800,000	600,000
AM peak hour traffic (vehicles)	3,000	1500	2000	500
Impervious surfaces (acres)	78	31	47	16

Sources: Approved GDP for the Sarnoff property, Penns Neck Area EIS travel demand forecasting model.

The consequent air quality and noise effects of the additional 500 trips generated by the 600,000 square feet of space have been quantified and incorporated into the analyses of the Action Alternatives that include an ESC road. The direct effects of impervious surface associated with the ESC road have also been quantified and incorporated into the analyses of the Action Alternatives that include an ESC road. In terms of potential secondary impacts to wetlands,

floodplains and water quality, the development on the Sarnoff site will be subject to a variety of federal, state and local regulatory processes designed to protect these resources. As such, secondary effects on wetlands, floodplains and water quality should be minimized.

As noted in the EIS, there are a number of cultural resources located on the Sarnoff property and a portion of the Sarnoff Property itself has been deemed eligible for listing on the National Register of Historic Places. Although it is reasonable to assume that development on the Sarnoff site may have an impact on these resources, it is impossible to predict with any certainty what these impacts may be. In addition, it is reasonable to assume that some of these impacts would result without the ESC road. As a private development, it will be the responsibility of the property owner and the municipality to ensure the protection of the natural and built environments as part of the site development process.

Cumulative effects

Cumulative effects are defined by the Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) as:

> *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)."*

In other words, cumulative effects look beyond the direct effects, and secondary effects to account for general changes and developments in the study area. Cumulative effects are not caused by the action. Rather, cumulative effects attempt to describe the context in which any action would exist. Thus, they provide an additional perspective for evaluating proposed action alternatives.

Traffic, Air Quality and Noise

Regional growth in traffic and its consequent air quality and noise impacts is largely determined by demographic changes in any given region. The magnitude of population and employment growth and patterns of development determine what impact growth will have on communities and the environment. The greater the growth and the more dispersed the land pattern, the greater the impact traffic will have.

Between 1980 and 2000, the Cumulative Effect Assessment (CEA) region added approximately 86,000 persons and 65,500 jobs. This represents a 64% increase in population and a 98% increase in employment. As shown in Table ES-11, the regional and local population and employment forecasts prepared for the EIS and incorporated into the EIS travel demand forecasting model project a 42% increase in population and a 76% increase in employment within the CEA region by 2028. The cumulative effect of this growth and development in terms of increased traffic and its consequent air quality and noise impacts are presented in the EIS as part of the analysis of the Action and No-Action Alternatives.

The air quality and noise impact analyses conducted as part of the EIS appropriately utilized these cumulative traffic forecasts. As presented at the previous Roundtable meeting, the results

of the air analysis indicate that none of the Action Alternatives would cause violation of the National Ambient Air Quality Standards in the core study area. Thus, the cumulative impact with an Action Alternative would not be adverse.

The results of the noise analysis indicate that existing conditions, as well as No-Action and Action Alternatives cause or would cause violations of the federal noise standard. Overall, the alternatives were determined to have an incremental noise impact due to cumulative traffic in the core study area.

Table ES-11
CEA Region Population & Employment Forecasts

	Base year *	2028	Absolute Change	Percent Change
Population	217,000	307,000	90,000	42%
Employment	143,000	251,000	108,000	76%

* Base year = 1999, 2000, or 2001 depending on data source.
Sources: US Census Bureau, DVRPC, NJTPA, NJDOL, Urbitran Associates

Wetlands

Of the total 23,696 acres of wetlands within the CEA study area, 236.74 acres would be impacted by Design Year 2028. Of this total, 159.90 acres are anticipated to occur over the next 25 years, representing 0.67% of the total wetlands present in the CEA study area. Of the 236.74 acres of cumulative wetland impact, a maximum of 0.31 acres, or 0.13% is attributable to the potential implementation of one of the Penns Neck Action Alternatives. This 0.31 acres of wetland impact represents 0.0013% of the 23,696 acres of existing wetlands within the CEA study area. Based on this information, and with proper adherence to and enforcement of state and federal wetland regulations, the portion of cumulative wetland impacts in the CEA study area would be negligible. Table ES-12 below provides a summary of potential cumulative wetland impacts in the CEA region.

Table ES-12
Summary of Past, Present & Reasonably Foreseeable Wetland Impacts in CEA Study Area

S.1.1.1 *TIME FRAME*	**Wetland Impacts (acres)**	**% of Cumulative Wetland Impacts**	**% of Total Wetlands in CEA Study Area**
Past (1988-2001)	76.84	32.46%	0.32%
Present & Reasonably Foreseeable (2001–2028)	159.59	67.41%	0.67%
Estimated Time of Completion (2008) – Action Alt.	0.31	0.13%	0.0013%
S.1.1.2 *TOTALS*	236.74	100%	1.0%

Impervious Surface

Given past trends and future forecasts for growth in population and employment, it is reasonable to assume that developed land in the CEA could increase at a rate similar to that of the past 25 years. Assuming a 3% annual increase in developed land through the year 2028 would yield an additional 38,400 acres of developed land in the CEA. Assuming a similar proportion of impervious surface will be present in the future, this growth rate would yield an estimated 10,400 acres of additional impervious surface by 2028. As shown in Table ES-13, the worst case action alternative in terms of new road-related impervious surface (Alternative B.2) would contribute less than half of one percent to the cumulative impervious cover effects that can be anticipated in the CEA.

Table ES-13
Summary of Past, Present and Reasonably Foreseeable Impervious Surface in CEA Study Area

Timeframe	Pavement (acres)	Percent of Cumulative Paved Surfaces
1996	10,700	50.6%
1996-2028	10,400	49.2%
Worst Case Action Alternative B.2 (e.g., greatest amount of impervious surface)	33	0.2%
CUMULATIVE TOTAL	21,133	100%

Floodplains

Flood-prone areas within the CEA study area total approximately 16,989 acres or 26.55 square miles. The NJDEP regulates development affecting floodplains under the Flood Hazard Area Control Act N.J.A.C. 7:13. These regulations provide protections for floodplains from physical disturbance, as well as control the discharge of runoff from paved surfaces to floodplains and water bodies. Under these regulations, a stream encroachment permit must be obtained for development that would either directly impact a floodplain or discharge stormwater to a regulated floodplain. Private development must also include stormwater management measures to comply with municipal drainage requirements.

As previously noted, a total of approximately 21,100 acres of impervious surfaces may cover the CEA study area by 2028. The addition of the Penns Neck Action Alternative with the greatest amount of paved surfaces (32.77 acres for Alternative B.2) brings this total to approximately 21,133 acres. The project portion of cumulative impervious surfaces in the CEA would be negligible as compared to cumulative impacts overall.

Surface Water Quality

Development in the CEA study area has and will continue to cumulatively impact surface water quality. As land is developed, temporary soil erosion/sedimentation impacts could result from clearing and grading sites. As described above, the amount of impervious surface in the CEA region is expected to grow as a result of the conversion of open land to development. Non-point

source pollution contained in runoff from impervious surfaces would be expected to contribute nutrients and sediment, as well as deicing salts, heavy metals, oils and greases, and other contaminants to the waterbodies.

Although future development can be expected continue to adversely effect surface water resources in the CEA study area, adherence to stringent NJDEP and D&RCC stormwater management regulations will partially mitigate impacts to surface water features during and after construction. The project contribution in the context of overall water quality in the CEA study area is incremental.

Groundwater Recharge

The NJDEP proposes to enhance existing regulations with new design and performance standards that would focus on water quality protection and recharge enhancement. These regulations, which are likely to be adopted during the design time frame of an Action Alternative, would establish guidelines for the development of municipal and regional stormwater management plans. It is anticipated that an Action Alterative, and other projects in the CEA, would be subject to these more stringent regulations. Thus, regulatory requirements that encourage groundwater recharge, and land preservation efforts will provide some compensation. Strong local, county and state initiatives to preserve parklands and open space will help to offset reduced groundwater recharge resulting from increased impervious surfaces in the CEA.

Historic and Archeological Resources

A variety of historic architectural and archaeological resources are located within the project study area. These include historic districts, structures, cemeteries, bridges, archaeological and other sites. Potential impacts to cultural resources in the CEA study area are significant due to on-going development pressure. Federal and state funded projects are required to recognize and assess impacts on cultural resources. This regulatory requirement provides some measure of protection. Protection of cultural resources threatened by private development is the purview of municipalities. Some municipal governments enact historic preservation ordinances; however, ordinances are often weak in terms of requiring property owners and developers to identify and protect cultural resources. The CEA study area communities are fortunate to have active historical organizations and interested individuals. These entities provide some protective benefit by alerting agencies to threatened resources, and pressing for their protection.

Depending upon the Action Alternative selected, up to 13 cultural resources in the study area could be adversely affected. Although this is a relatively small number of resources in the context of the many resources in the CEA study area, it is a notable number considering the small size of the study area and extent of the contemplated alternatives. As with the other NEPA issues, selection and development of an Action Alternative must consider means to avoid, or at least minimize adverse cultural resource impacts, and must provide appropriate mitigation to overcome adverse impacts.

Open Space Resources

Growth in the PSA and CEA through Design Year 2028 is expected to consume a significant part of remaining undeveloped lands. The pressures to preserve land for parks and open space in the CEA study area are great due to on-going development. Mercer and Middlesex County both have active land preservation programs and many of the CEA region municipalities have dedicated sources of local revenue to purchase open space. Over the past two decades, these programs have been successful in permanently preserving a significant amount of open space in the CEA region. None of the Action Alternatives would physically impact dedicated parks or open space, although some alternatives may cause localized auditory or visual intrusion due to changes in traffic volumes on existing roads, or new roads. However, in the cumulative context, an Action Alternative would have a negligible adverse impact on the open space resources in the CEA.

In summary, throughout the 2028 SCEA timeframe, residential, research/development and office development is expected to continue to occur throughout the CEA study area. This growth and development is likely to result in impacts to most of the resources identified in the SCEA. As explained above, regulations have been and are expected to be enacted specifically to protect many of these resources. These regulations require that project sponsors make all reasonable efforts to avoid impacts, minimize unavoidable impacts, and as appropriate, implement compensatory mitigation for unavoidable resource impacts.

CONSTRUCTION IMPACTS

Construction impacts are consequences of activities undertaken during the construction phase of a project. These impacts are considered to be temporary, and are distinct from permanent impacts presented in other sections of the EIS. As is common in the preparation of an EIS, because of the conceptual nature of the Action Alternatives, the consideration of potential construction impacts is necessarily general in nature. Developing a detailed construction approach typically occurs during the design phase of a project, when specific alignments are known. Development of a construction approach during the design phase of project development ensures that the project can be built while avoiding or minimizing to the greatest extent possible adverse temporary effects on the natural and built environments.

Natural Resources Protection

The NJDEP regulatory framework specifies strategies that would have to be used during construction of any Action Alternative to avoid or minimize impacts to natural resources. The Flood Hazard Control Regulations (NJAC 7:13-1.1 et seq), the NJDEP's *Technical Manual for Stream Encroachment*, the Freshwater Wetlands Protection Act Rules (NJAC 7:7A), and *Regulations for the Review Zone of the Delaware and Raritan Canal State Park* (NJAC 7:45-1.1 et seq) mandate that areas of temporary disturbance be minimized during construction; disturbance areas be delineated and fenced; and, ultimately, temporarily disturbed areas be restored at the end of the construction period.

Maintenance and Protection of Traffic

Construction of an Action Alternative would occur in stages over approximately a 3-year period. A project construction phasing plan and appropriate traffic control plan would be developed during final design to coordinate construction activities and minimize disruption of traffic movements. Public awareness programs to inform residents and motorists about potential

construction delays and patterns would be implemented by the NJDOT. Every effort would be made to avoid, or at least minimize, traffic impacts. During final design, a detailed construction phasing plan would be developed for the entirety of an Action Alternative, including not only Route 1 but also the Northeast Corridor bridge crossing, Washington Road, Vaughn Drive and the east- and west-side connectors, as they apply. The overall phasing plan must also consider activities external to the project, such as the Alexander Road Bridge replacement project. Special attention would be paid to ensuring that the construction phasing and traffic control plans of multiple projects work together to minimize traffic impacts. In addition, a traffic control plan would be developed to accommodate traffic movements that existed on roadways immediately prior to the construction period to the greatest extent practicable.

Community Protection

Construction activities can have adverse visual and auditory impacts on the community in which they occur. In some cases, impacts can be avoided by carefully locating material stockpile and equipment storage areas away from places where people live. More than likely, however, some impacts are unavoidable, and best efforts must be used to minimize the adverse impacts of construction. A key component in community protection is keeping the community apprised of activities during construction. Community awareness minimizes surprises and allows the community to prepare for activities that may impact them. To the greatest extent possible, the community would be kept informed of the elements of each construction stage that have the potential to affect them: traffic management, unavoidable noisy operations and activity durations, for example. Other efforts include physical protections. The placement and maintenance of fencing around the work area would contain the work activity and protect the community from potential construction hazards.

Construction may result in short-term impacts to local air quality resulting from construction equipment activities, temporary changes in traffic operations and distribution, and soil exposure. NJDOT *Standard Specification, 107.28 Environmental Protection, Section 2 – Control of Noise and Air Pollution*, would be followed during construction periods to minimize construction related air quality impacts. An appropriate traffic control plan, previously described, may limit localized emissions during construction. Soil erosion control measures on the worksite would minimize airborne dust: vegetative stabilization of soils and/or wetting of soils within the construction zone, and transport of topsoil in tarpaulin-covered trucks, among other techniques.

The area adjacent to the construction right-of-way of an Action Alternative would experience an increase in noise levels during construction. Generally, roadway construction involves land clearing and grading, placing of structures, and paving. As previously described, a number of the Action Alternatives would include the construction of Route 1 in-a-cut. Preliminary geotechnical borings along Route 1 suggest that rock removal can be undertaken for Route 1 in-a-cut using typical excavation methods. NJDOT's standard construction noise mitigation measures would be included in the specifications for an Action Alternative to minimize noise impacts during construction. To minimize the duration of high noise levels, noisy operations should be scheduled concurrently as the combined noise level would not be significantly greater than the level produced if the operations were done separately, and the duration of the activities would be less.

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Chapter 1.0

Introduction

1.0 Introduction

The Federal Highway Administration (FHWA), in cooperation with the New Jersey Department of Transportation (NJDOT), proposes to make transportation improvements to address traffic congestion, mobility constraints, and safety concerns on Route 1 and east-west cross streets in the Penns Neck area of West Windsor Township, Mercer County, New Jersey and its environs (see Figure 1-1).

This Environmental Impact Statement (EIS) was prepared to investigate the potential impact of Action and No Action Alternatives. The EIS was prepared in accordance with the implementing regulations of the National Environmental Policy Act (NEPA) of 1969 (42 United Stated Code (USC) 4321 et seq.), Section 4(f) of the Department of Transportation Act of 1966 (23 USC 138 and 49 USC 303), and the FHWA Guidance for Preparing and Processing Environmental and Section 4(f) Documents (Technical Advisory T 6640.8A, 1987).

This chapter includes an overview of the EIS study area, a statement of the purpose and need for the project, a list of the project goals and objectives, a brief section on project history and background, an overview of the EIS scoping process, and a statement regarding the relationship between the EIS and Context Sensitive Design principles.

1.1 Study Area

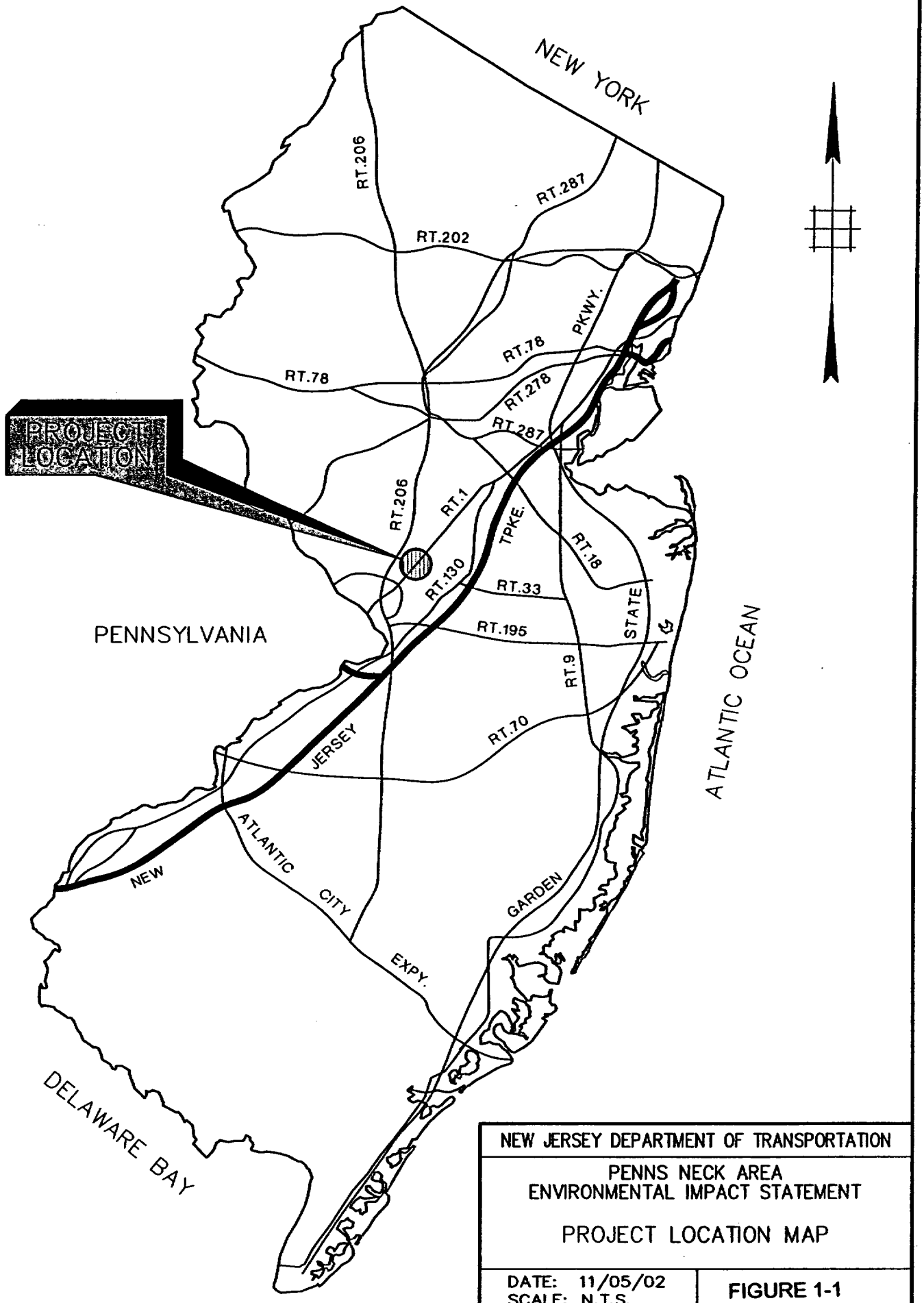
The study area for the Penns Neck Area EIS has been structured into overlapping regions. Figure 1-2 depicts these regions that are described below. The ***primary study area*** (PSA) is composed of the municipalities of Plainsboro Township, Princeton Borough, Princeton Township, and West Windsor Township. This area approximates a five-mile radius from the intersection of Route 1 and Washington Road in West Windsor Township. The PSA boundary is defined flexibly, so as to permit the inclusion of significant origins and destinations located on the fringe of the five-mile radius and to respond to the technical needs of the EIS study.

The ***secondary study area*** (SSA), which is composed of twenty municipalities in Mercer, Middlesex and Somerset counties, provides a regional context regarding demographic and travel patterns. The SSA municipalities include: East Windsor Township, Hightstown Borough, Hopewell Borough, Hopewell Township, Lawrence Township, Pennington Borough, Princeton Borough, Princeton Township, Washington Township and West Windsor Township in Mercer County; Cranbury Township, Jamesburg Borough, Monroe Township, Plainsboro Township and South Brunswick Township in Middlesex County; and Franklin Township, Hillsborough Township, Millstone Borough, Montgomery Township and Rocky Hill Borough in Somerset County.

A **core study area** was defined for considering transportation impacts from actions/alternatives investigated in the EIS. The core study area is generally bounded

by the Millstone River to the north, Alexander Road to the south, Clarksville Road to the east and Route 27 to the west.

In addition, several smaller resource-specific study areas have been defined for the purpose of considering potential impacts from the alternatives considered in the EIS. The specific boundaries of these resource-specific study areas were determined by the nature of the alternative under consideration and the potentially affected resource. Chapter 3 includes a detailed description and maps of these smaller study areas.



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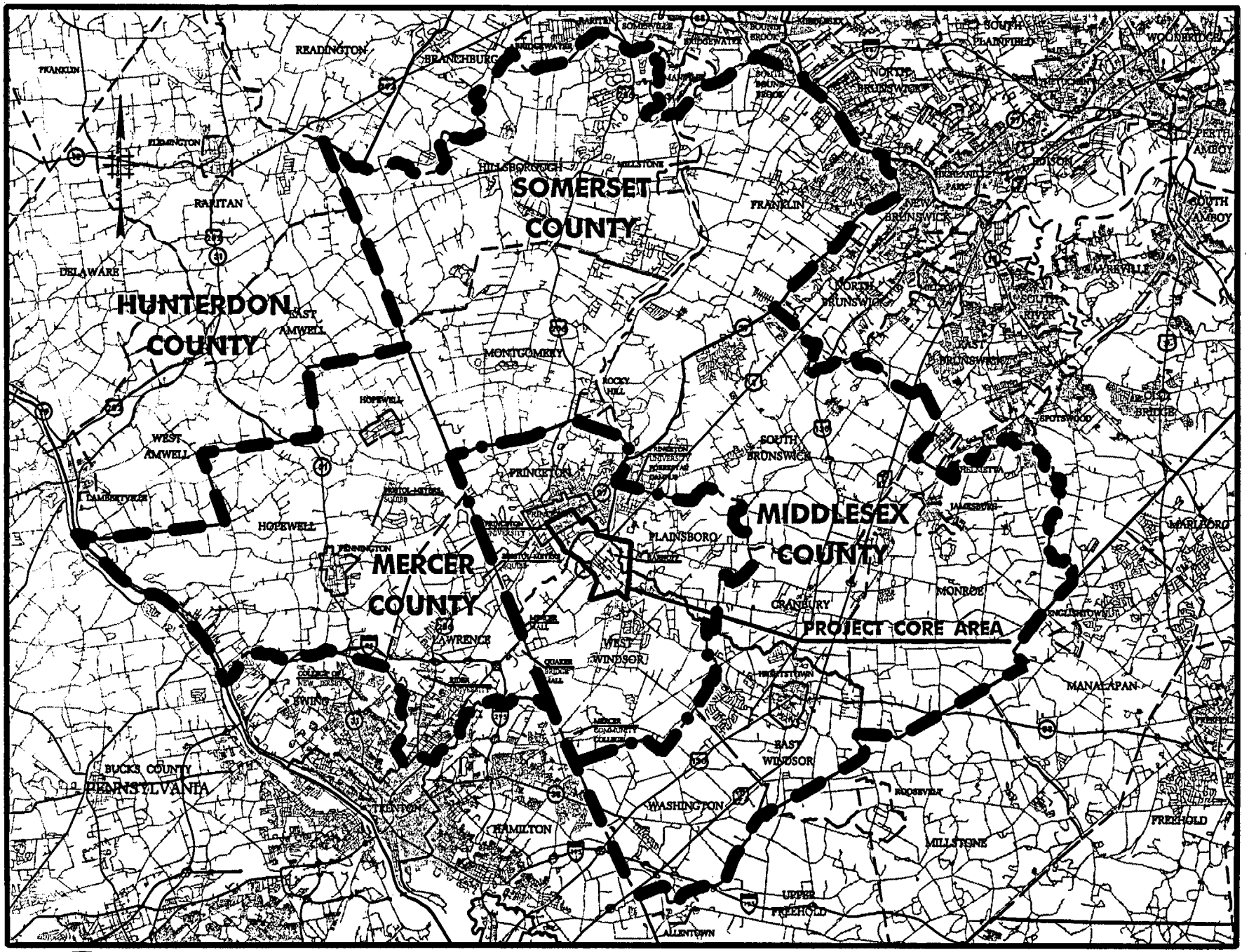
NEW JERSEY DEPARTMENT OF TRANSPORTATION	
PENNS NECK AREA ENVIRONMENTAL IMPACT STATEMENT PROJECT LOCATION MAP	
DATE: 11/05/02 SCALE: N.T.S.	FIGURE 1-1

PENNS NE[illegible] AREA – EIS
AREA OF INVESTIGATION



LEGEND

PRIMARY AREA OF INVESTIGATION

SECONDARY AREA OF INVESTIGATION

COUNTY BOUNDARIES

MUNICIPAL BOUNDARIES

SCALE: NOT TO SCALE

FIGURE 1-2

1.2 Project Purpose and Need

1.2.1 Project Purpose

The purpose of the project is to address traffic congestion, mobility constraints and safety concerns on U.S. Route 1 and the east-west cross streets in the Penns Neck area of West Windsor Township, Mercer County, New Jersey and its environs (Figure 1-1).

1.2.2 Project Need

The following statement of project need is based on the *Working Problem Statement* (Appendix E) developed and agreed by members of the Penns Neck Area EIS Partners' Roundtable, described below in Section 1.5. The *Working Problem Statement* is included for reference in Appendix E. Additional detail and data regarding existing and future land use and transportation conditions can be found in Chapters 3 and 4.

Employment and population growth trends
The PSA, for the past 20 years, has seen robust growth in both employment and population. According to the July 2002 *Local Area Land Use Inventory and Forecast Study* (Urbitran, 2002) prepared for this EIS, between 1980 and 2000 the number of jobs located in the PSA grew from an estimated 29,800 to 57,700. This represents a 94 percent increase. Over the past two decades, West Windsor and Plainsboro Townships have emerged as significant employment centers in the region. Approximately 46,300 jobs, or 80 percent of the PSA's employment, is located in these two townships. Residential growth in the PSA has also been robust. Between 1980 and 2000, population grew from 39,900 to 72,400, an 81 percent increase.

Land use patterns
With the exception of Princeton Borough, the land use pattern in the PSA is decentralized and auto-oriented. The dominant land use pattern is single-use office and retail development, built at low density, adjacent to highways with free parking and beyond walking distance from major transit facilities. Residential subdivisions are designed in isolation from one another and other uses and have been built at relatively low densities. Figures 1-3 through 1-5 illustrate the geographic distribution of residential and office and research employment in the PSA towns.

Most of the 46,000 jobs located in West Windsor and Plainsboro Townships are concentrated between Route 1 and the Northeast Corridor rail line in decentralized office and retail sites. Work sites in West Windsor are located primarily along Alexander Road and in the Carnegie Center office complex east of Route 1. Work sites in Plainsboro Township are located primarily in the Forrestal Center office complex and at work sites on Plainsboro Road and Scudders Mill Road. The number

of workers employed in these two townships is almost equal to that of the Newark Central Business District, which has approximately 50,000 jobs.

Figure 1-3: Location of residential development in the primary study area

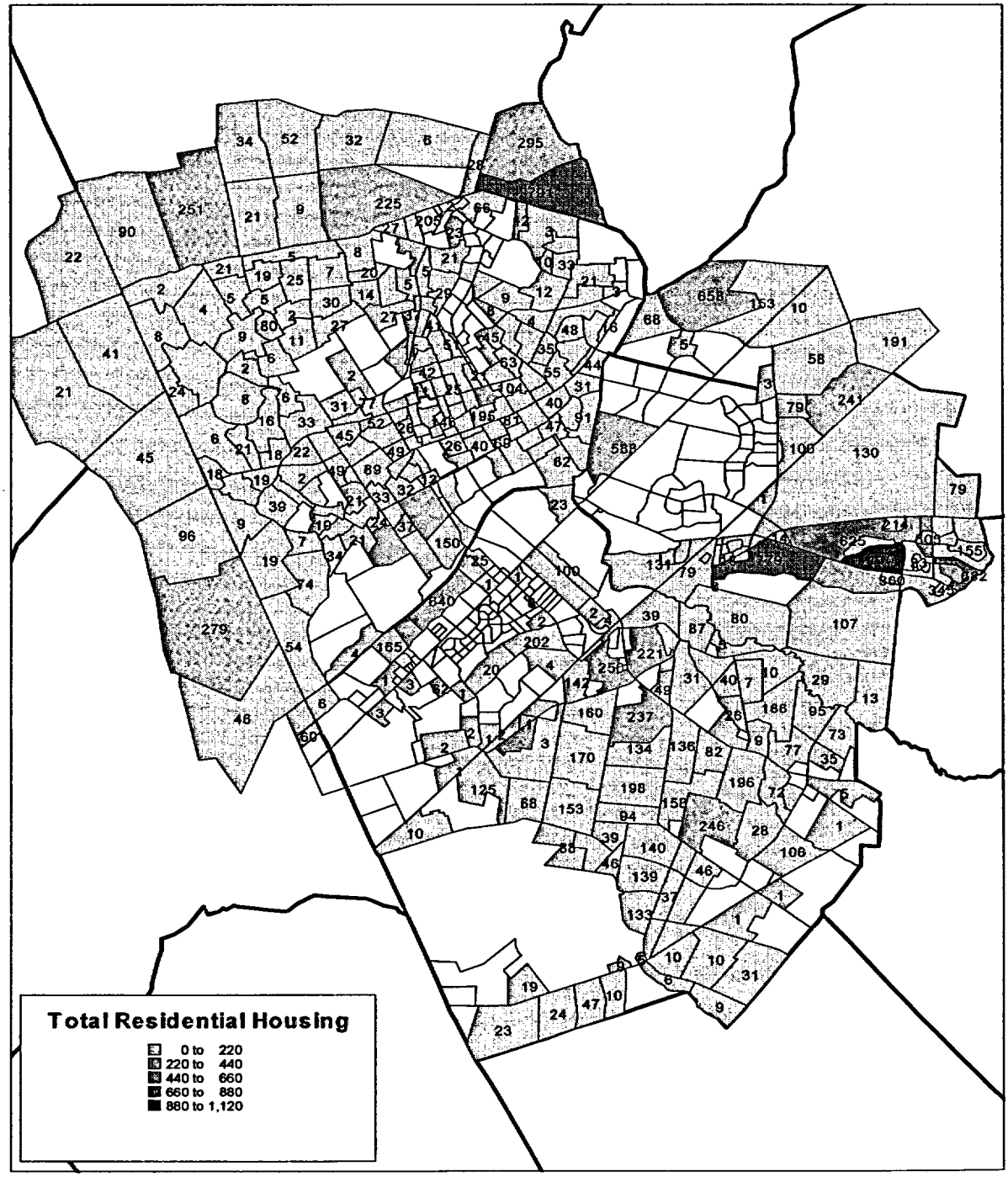


Figure1-4: Location of office space in the primary study area

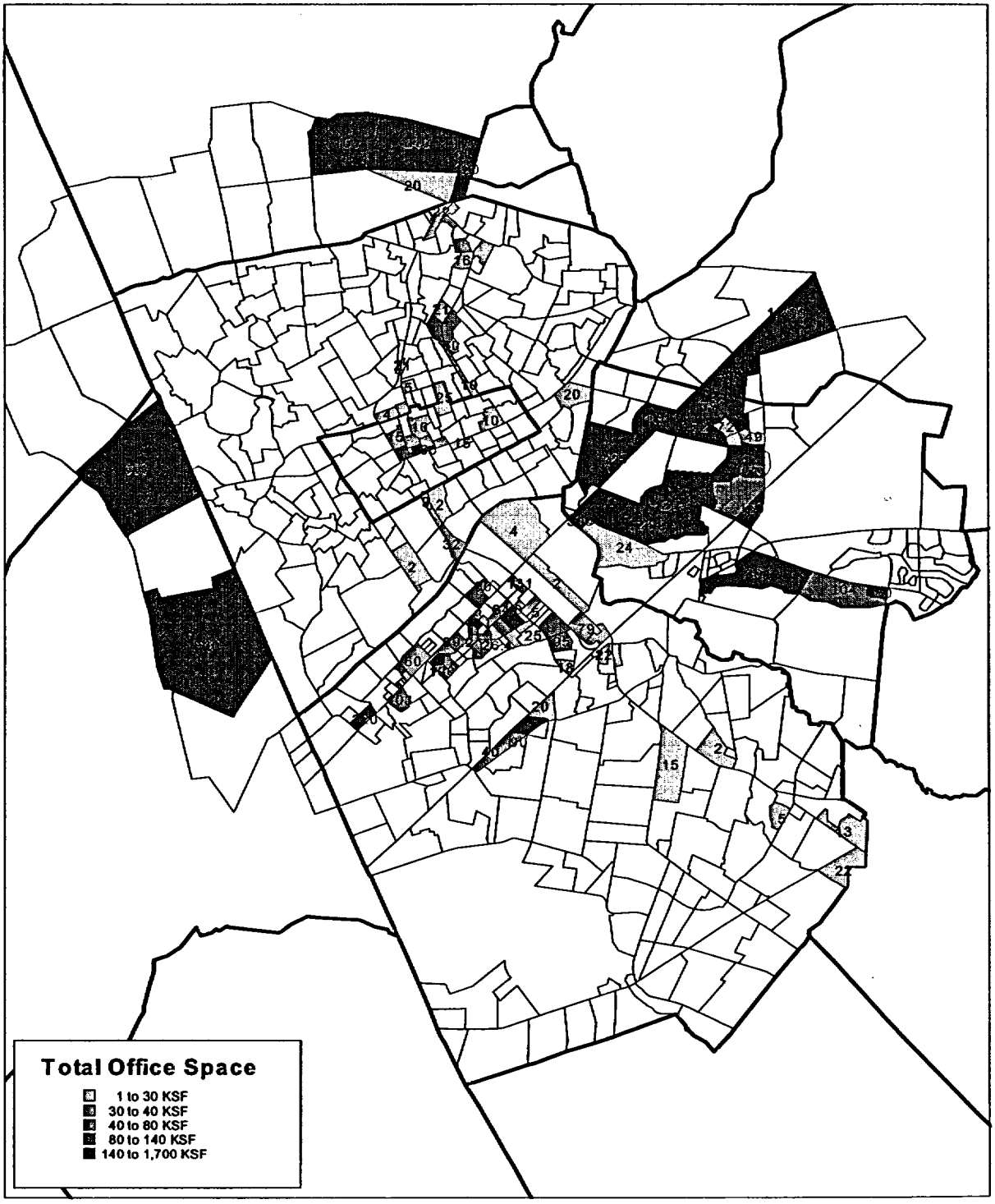
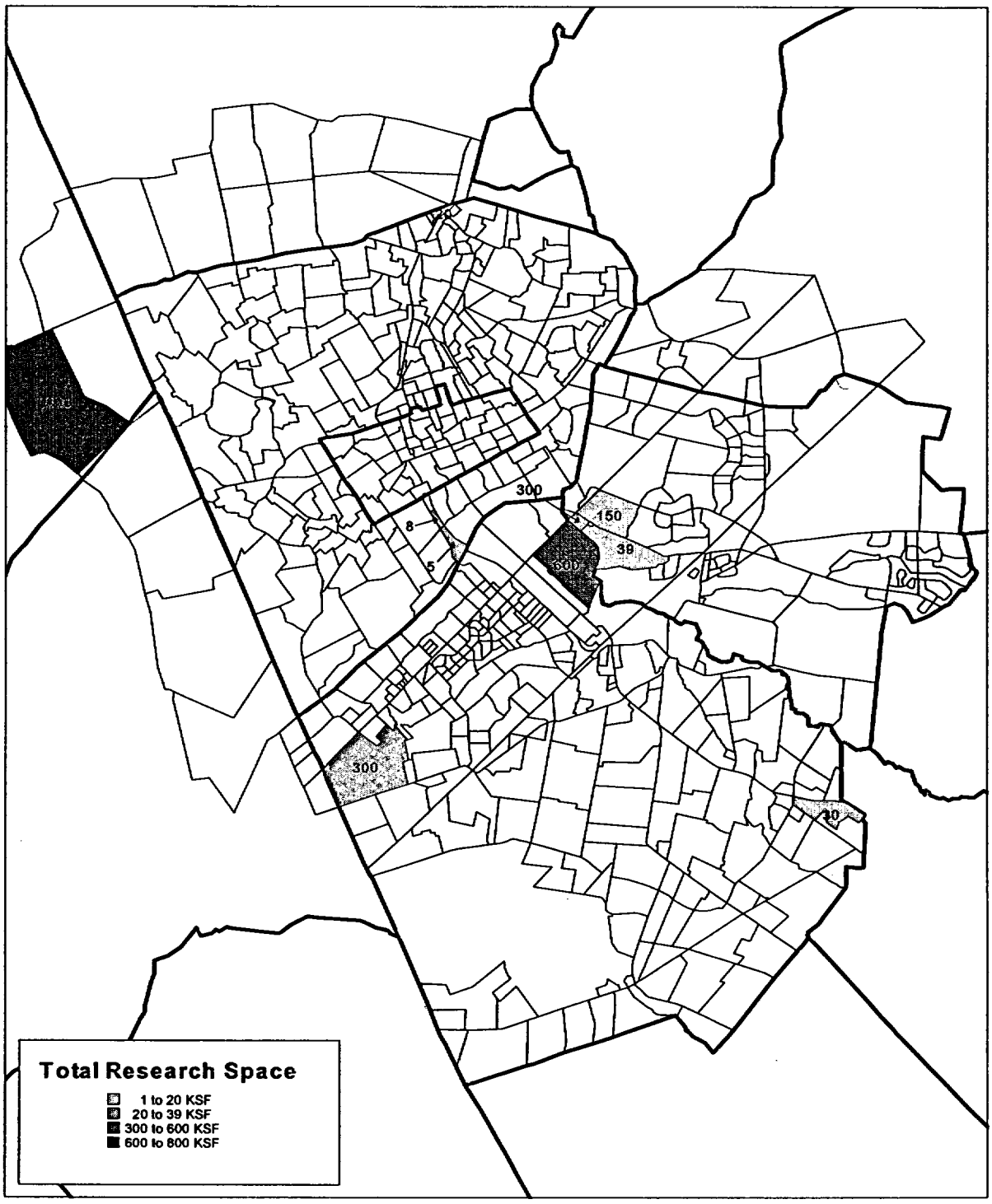


Figure1-5: Location of research space in the primary study area



Traffic generation
Employment sites located in West Windsor and Plainsboro Townships, between the Northeast Corridor rail line and Route 1, are major traffic generators, primarily for automobiles. According to the *East-west Origin and Destination Survey Study* (Urbitran, 2002) conducted for this EIS, the average occupancy of vehicles traveling to employment destinations in the area is a low 1.2 persons per vehicle.

These growth trends and land use and traffic generation patterns are projected to continue, against the backdrop of a constrained regional and local transportation infrastructure system.

Transportation and mobility constraints
The transportation facilities that lie at the focal point of this employment and residential growth have severe limitations in their ability to handle growing travel demand. The congested roadway network is constrained by discontinuous roads, the absence of a robust grid pattern and absence of grade separations. Some existing public transportation services and facilities are well-used but limited in trip purpose, and others are not particularly effective in serving the low-density land use pattern of employment sites. The area's bicycle and pedestrian network is not well developed. The utility of these modes is also limited by the area's single-use, low-density land use pattern.

Roadway network – The major roads traversing the Penns Neck area include the following:

- *Route 1* is the area's major north-south highway artery. It consists of three travel lanes in each direction with no shoulders. This toll-free road functions both as an inter-regional auto and truck corridor and as a local land access road for properties fronting the highway, including major employment destinations. Approximately 82,700 vehicles per day use Route 1 between Washington Road and Harrison Street.

- *East-west cross streets* in the Penns Neck area include: Alexander Road, CR 571/Washington Road, Fisher Place and Harrison Street. Washington Road is a 2-lane road, which crosses Route 1 at a signal-controlled intersection. Fisher Place, which is located just north of Washington Road, is a residential local street east of Route 1 that also crosses Route 1 at a signal-controlled intersection. Fisher Place is used by many motorists seeking to avoid congestion at the Route 1/Washington Road intersection. Harrison Street is a 2-lane roadway that intersects with Route 1 north of Fisher Place at a signal-controlled intersection opposite the Sarnoff Corporation driveway. Alexander Road crosses Route 1 on an overpass and varies between two and four lanes. Data from the Penns Neck travel forecasting model indicate that an estimated 25,900 vehicles per day use Alexander Road east of Route 1, 20,400 vehicles per day use Alexander Road west of Route 1, 20,100 vehicles per day use

Washington Road east of Route 1, 17,500 vehicles per day use Washington Road west of Route 1, and 12,100 vehicles per day use Harrison Street.

Route 1 traffic through the Penns Neck area is controlled by the three closely-spaced traffic signals at Washington Road, Fisher Place and Harrison Street. Because of the high volume of traffic using Route 1, through movement of traffic on Route 1 is given signal priority over east-west traffic seeking to enter or cross Route 1 at these locations. In the AM peak hour, the Penns Neck area traffic signals function on a 240 second signal cycle, the second longest cycle used in the state. Route 1 receives 70 percent or 170 seconds of cycle "green time." East-west cross streets receive 30 percent or 70 seconds of "green time". In the PM peak hour the signals function on a 120 second signal cycle with a similar allocation of "green time." This results in significant travel delays on Route 1 and east-west cross-streets in the Penns Neck area.

- According to an intersection level-of-service analysis conducted for the EIS, average AM peak hour intersection delays on Route 1 northbound at the Washington Road intersection are 2.1 minutes and Route 1 southbound are 1.8 minutes. In the PM peak hour, delays on Route 1 at Washington Road average 0.4 minutes in the northbound direction and 1.2 minutes in the southbound direction.

  At the Route 1-Harrison Street intersection, AM peak hour intersection delays average 1.6 minutes in both the north and southbound direction. In the PM peak hour, average delays on Route 1 at Harrison Street are 0.8 minutes in the northbound direction and 1.9 minutes traveling southbound. According to travel simulation data from the EIS travel demand forecasting model, average travel time on the 2.4 mile segment of Route 1 between Carnegie Center Boulevard in West Windsor Township and Scudders Mill Road in Plainsboro Township, range from 4 to 5 minutes in the AM peak hour and 4 to 6 minutes in the PM peak hour.

- Intersection level-of-service analyses also documented significant intersection delays on Washington Road and Harrison Street in the Penns Neck area. These delays, which are due in part to the Route 1 signal timing, were longer and more widely varied that north-south delays. Average AM peak hour intersection delays on Washington Road approaching Route 1 are 4 minutes in the eastbound direction and 2 minutes traveling westbound. In the PM peak hour, delays approaching Route 1 on Washington Road average 5 minutes in the eastbound direction and 2.4 minutes traveling westbound. AM peak hour delays on Harrison Street approaching Route 1 in the eastbound direction are 8.2 minutes and 1.6 minutes in the westbound direction. In the PM peak hour, delays on Harrison Street approaching Route 1 are 6.2 minutes in the eastbound direction and 1.4 minutes traveling westbound.

  Under typical conditions, the minimum and maximum observed delays varied widely from 0.7 to 11.2 minutes on Washington Road and 0.4 to 11.8 minutes on Harrison Street. Average east-west travel times between Clarksville Road

in West Windsor Township and Nassau Street in the vicinity of Alexander Road, Washington Road and Harrison Street, in Princeton Borough – an average travel distance of 3.6 miles – range from 10 to 13 minutes.

The existing roadway system lacks the connectivity of a grid system and funnels traffic onto a few principal roads. Much of the burden falls to Route 1, because there are few parallel connector roads adjacent to either side of Route 1 that can serve as effective alternate routes for reaching employment and other destinations in the Penns Neck area. In addition, the capacity of Route 1 to process traffic is limited by the three Penns Neck area traffic signals and its three travel lanes in each direction with no shoulders.

The east-west road system does not efficiently distribute traffic to and from Route 1 and employment destinations in the Penns Neck area. Roads vary in widths, have lane drops and lack turning lanes in many locations. Many routes pass through residential and college neighborhoods and business districts with heavy pedestrian traffic, do not meet existing peak period traffic demand and function at impaired levels of service.

Conditions on Route 1 and east-west cross-streets in the Penns Neck area result in congestion and contribute to commuter and resident frustration. In addition, congested conditions and intersection geometry contribute to high accident rates at the Penns Neck Circle (the Route 1/Washington Road intersection). These congested conditions are perceived by many local officials and residents to impede the ability of emergency personnel to respond effectively.

Public transportation – The pattern of development in the study area encourages dependency on auto use and imposes constraints on providing a comprehensive network of public transportation services, particularly for travel within the PSA. The existing public transit network includes commuter rail service on the Northeast Corridor rail line with a stop at the Princeton Junction train station – one of the busiest outlying stations on the NJ TRANSIT rail system, rail shuttle service via the "Dinky" from the Princeton Junction Station to Princeton Borough, express commuter bus service to New York City, three local bus routes and a variety of public and private shuttle services providing access to and from the Princeton Junction train station.

While the public transportation network provides a high quality of service to external destinations, the characteristics of service, including number of routes, frequency of service, hours of operation, required transfers and travel times, are less than optimal for travel into and within the study area due primarily to its pattern of development.

Bicycle and pedestrian network – There are various reasons why pedestrian and bicycle travel is not more widely used to access employment and other destinations in the study area. Although the terrain and local topography of the PSA is conducive to pedestrian and bicycle travel, with the exception of Princeton Borough, land uses are dispersed and auto-oriented. In addition, pedestrian and bicycle infrastructure is often

lacking. The sidewalk network, including cross walks, in the Penns Neck and Princeton Junction neighborhoods and the train station area is discontinuous and incomplete, and many pedestrian routes appear to be unsafe.

The area's bicycle network is similarly discontinuous and incomplete. There are few striped bicycle lanes and separate bike paths, especially in West Windsor and Plainsboro. The bicycle network is disconnected, and travel between major origins and destinations is difficult.

Travel demand management – As in other comparable suburban areas, travel demand management strategies are not widely used in the study area. Alternative work arrangements, such as telecommuting and compressed work week arrangements, are limited. Employer-sponsored flex-time policies do exist but are not early and late enough to shift travel out of peak periods; moreover, flex-time makes car and van-pooling more difficult. Although there are two transportation management associations servicing the region, which provide a number of support programs to promote the use of commute options and alternative work arrangements, there are few incentives or impositions to foster alternative commute patterns.

Growth forecasts and future travel conditions

Growth trends, especially for employment, are expected to continue into the foreseeable future for the PSA. According to the *Local Area Land Use Inventory and Forecast Study* (Urbitran, 2002), an estimated 39,000 new jobs and 8,900 new residents are expected in the PSA by the year 2028, the planning horizon year for the EIS (see Table 1-1). The study forecasts that 97 percent of the PSA's population and employment growth will occur in West Windsor and Plainsboro Townships. Given current zoning regulations and the fact that there is 12,750,000 square feet of additional single-use, low-density, campus-style office space already approved by local planning boards in the PSA, it is reasonable to assume that this pattern of development will continue as well. These trends are expected to worsen travel conditions in the Penns Neck area in the future.

Table 1-1

Study Area Population, Households, and Employment 2001-2028

	2001	2028	Absolute Change 2001 -2028	Percent Change 2001-2028
POPULATION				
Plainsboro Twp.	21,865	23,070	1,205	6%
Princeton Borough	15,054	15,137	83	1%
Princeton Twp.	16,947	17,143	196	1%
West Windsor Twp.	22,911	30,343	7,432	32%
Study Area Total	**76,777**	**85,693**	**8,916**	**12%**
EMPLOYMENT				
Plainsboro Twp.	27,266	40,530	13,264	49%
Princeton Borough	5,561	5,680	119	2%
Princeton Twp.	5,854	6,917	1,063	18%
West Windsor Twp.	18,991	43,915	24,924	131%
Study Area Total	**57,672**	**97,042**	**39,370**	**68%**

Source: *Local Area Land Use Inventory and Forecast Study* (Urbitran, 2002)

The Penns Neck Area EIS Travel Demand Forecasting model, which is described in detail in Chapter 4, was used to examine potential future No-Action travel conditions assuming: 1) 2028 population and employment forecasts; 2) no roadway improvements in the immediate Penns Neck area; and 3) currently planned improvements to other roadways in the primary and secondary study area. A full description of the future No-Action roadway network assumptions is provided in Appendix D.

This projected demographic growth will increase AM peak hour traffic demand on all of the Primary Study Area's principal roadways, but in varying proportions. On Route 1 northbound, AM peak hour traffic is estimated to increase by approximately 25%. On Route 1 southbound AM peak hour traffic is projected to increase 33%. The greatest AM peak hour increases on east-west roads are forecast for Alexander Road eastbound east of Route 1 (+102%), Washington Road eastbound west of Route 1 (+157%); Washington Road westbound east of Route 1 (+75%); and Harrison Street eastbound east of Route 1 (+87%).

Data from the model indicates that congestion conditions would worsen noticeably on Route 1 by 2028. Average intersection delays on Route 1 at Washington Road would increase from the existing 0.4 to 2.1 minutes to 3.0 to 5.9 minutes in 2028. Route 1 delays at Harrison Street would increase from the existing 0.8 to 1.9 minutes to 3.0 to 7.8 minutes in 2028. Travel time on Route 1 between Carnegie Center Boulevard in West Windsor Township and Scudders Mill Road in Plainsboro Township would exceed 15 minutes in the peak direction of travel in both the AM and PM peak hour, up from approximately five minutes today.

The model predicts even more severe delays crossing Route 1 at the at-grade intersections. Travel delays crossing Route 1 at Washington Road would increase from the existing 2.4 to 5.0 minutes to more than 16 minutes in 2028. Travel delays on Harrison Street approaching Route 1 would increase from the existing 1.4 to 8.2 minutes to more than 16 minutes in 2028. Average east-west travel times between Clarksville Road in West Windsor Township and Nassau Street in the vicinity of Alexander Road, Washington Road and Harrison Street in Princeton Borough would range from 18 to more than 21 minutes, up from 10 to 13 minutes today.

The above demonstrates future traffic conditions without the proposed Penns Neck improvements

1.3 Project Goals and Objectives

The project purpose should be accomplished while protecting and enhancing the many unique and important natural, cultural, historic, community and economic resources located in the area. These resources include, but are not limited to:

- The Millstone River and its watershed;
- Little Bear Brook;
- The Delaware and Raritan Canal State Park;
- The Delaware and Raritan Canal;
- Lake Carnegie;
- The Washington Road Elm Allée (extending from Route 1 to the Delaware and Raritan Canal);
- The Princeton Baptist Church of Penns Neck;
- The Red Lion Inn on Washington Road in Penns Neck;
- The Cemetery at the Princeton Baptist Church of Penns Neck and the Schenck-Covenhoven Cemetery in the Princeton University fields off Washington Road, in West Windsor;
- Natural areas, including forests and wetlands in the study area, which provide habitat for a variety of wildlife, including at least one State threatened species;
- Archaeological sites in the study area;
- The Aqueduct Mills Historic District in West Windsor and Plainsboro;
- The Covenhoven-Silvers-Logan House in West Windsor;
- The Princeton Operating Station in West Windsor;
- The Sarnoff Corporation (formerly RCA Laboratories – David Sarnoff Research Center);
- Residential neighborhoods throughout the study area;
- Princeton University; and
- Businesses and institutions located in the study area.

Thus, any Penns Neck Area improvement must carefully balance transportation, development, environmental and community needs.

The following goals and objectives were developed based on public input received during the EIS scoping process and with significant input from the Partners' Roundtable. A copy of the project goals and objectives developed and agreed by the Partners' Roundtable is provided in Appendix E.

Goal: For all modes of transportation, improve access, mobility and safety and reduce congestion.
Objectives:

- Reduce travel delay and rate of growth in congestion throughout the primary study area, as measured by vehicle miles traveled (VMT), vehicle hours traveled (VHT), volume/capacity ratio (v/c), and level of service (LOS).
- Improve the flow of traffic on Route 1.
- Improve the flow of east-west traffic on both sides of Route 1, and reduce intersection delays when crossing north-south highways.
- Ensure an equitable balance of traffic on various east-west routes on both sides of Route 1.
- Discourage through traffic on residential streets and direct non-local traffic to appropriate transportation facilities.
- Discourage heavy truck through movements on local east-west roads.
- Encourage regional use of transportation demand management (TDM) strategies to foster the use of alternate transportation choices for trips to employment sites, train stations and other destinations, in order to reduce auto dependence and single occupant vehicles (SOVs).
- Provide better access and safety for pedestrians and bicyclists and effective transportation options for underserved populations.
- Address the needs of emergency response personnel and vehicles.
- Reduce the number of curb cuts along Route 1, and make use of collector/distributor lanes on Route 1, where consistent with other objectives.

Goal: Protect and enhance the environment and natural resources.
Objectives:

- Preserve or improve water quality in the Millstone River watershed and the Delaware and Raritan Canal.
- Protect against flooding and encourage stormwater recharge, where appropriate.
- Protect wetlands.
- Avoid impacts to federal and state rare, threatened, and endangered species.
- Consider underlying geological conditions (i.e., bedrock, groundwater, etc.).
- Avoid habitat fragmentation.

- Meet federal and state air quality standards.

Goal: Protect and enhance natural areas, parks and open space.
Objectives:

- Protect permanently preserved open space.
- Protect against adverse visual, light, and noise impacts to natural areas and parks.
- Protect and enhance access and use of recreational facilities.

Goal: Protect and enhance historic and archeological resources.
Objectives:

- Protect and enhance historic resources that have been:
  - locally designated;
  - identified as eligible for State or Federal Register;
  - listed on State Register; or
  - listed on Federal Register.
- Avoid disturbances to archeological resources.

Goal: Protect and enhance the integrity of residential neighborhoods.
Objectives:

- Minimize adverse impacts on the integrity of neighborhoods, including neighborhood fragmentation, residential displacements, and traffic-related visual and noise impacts.
- Enhance pedestrian/bicycle amenities, access and safety to schools and other community facilities.
- Enhance vehicular access and safety to schools and other community facilities.
- Ensure that impacts are appropriate for the character of the existing roads and neighborhoods.
- Ensure that transportation (pedestrian/bicycle/transit/road) impacts do not disproportionately affect one neighborhood over another.
- Be aware of unintended consequences (e.g. diverted traffic).

Goal: Maintain the viability of institutional and business communities.
Objectives:

- Minimize adverse effects on development of campuses.
- Enhance vehicular access and safety to institutions and businesses.
- Enhance pedestrian/bicycle amenities, access, and safety to institutions and businesses.

- Be aware of unintended consequences (e.g. diverted traffic).

Goal: Recognize the interrelationships between land use and transportation.
Objectives:

- Consider impact on land use induced by any transportation improvement.
- Ensure that improvements are "sustainable."
- Maximize the compatibility of actions with the goals and objectives of municipal Master Plans and the NJ State Development and Redevelopment Plan.

Goal: Provide an open, inclusive, transparent and responsive EIS process.
Objectives:

- Create a process that embraces the principles of context sensitive design, fosters innovation and considers all ideas.
- Create a process that meets or exceeds Federal requirements.
- Ensure that important but tangential issues raised in the EIS process that cannot be addressed by the EIS process are directed to the appropriate entity for action.
- Create a process in which data are accessible and in which the models used are understandable and the assumptions are clearly defined.

Goal: Provide a proactive, comprehensive and ongoing public participation program.
Objectives:

- Provide a variety of forums to solicit broad public participation from a wide variety of perspectives.
- Ensure that opportunities for public input are widely communicated.
- Facilitate cross-communication between agencies, groups and individuals.

1.4 Project History and Background

1.4.1 Early project activities

In 1986, NJDOT completed the Route 1 Corridor Transportation Study. The study examined growth trends and future infrastructure needs along the 19-mile segment of Route 1 between Trenton and New Brunswick. The study identified a variety of corridor needs and highlighted a number of important policies regarding the future of the Route 1 corridor in Mercer and Middlesex Counties, including, but not limited to the following:

- Route 1 should be managed to protect its function as a principal arterial highway.
- All traffic signals on Route 1 should eventually be replaced by grade-separated interchanges at major regional cross streets. Priority locations identified in the

study included: Quakerbridge Road, Alexander Road, Princeton-Hightstown Road (CR571), Scudders Mill Road, Ridge Road, Livingston Avenue and Route 130.

- Route 1 should be widened to provide three lanes with shoulders in each direction.

Consistent with this policy direction, NJDOT, in the mid-1980s, initiated a number of projects intended to implement the corridor study recommendations by developing improvement plans for each of the priority intersections. An Environmental Assessment (EA) of this corridor improvement plan was issued by NJDOT in March 1991.

Improvement plans in the Penns Neck area included five alternative alignment schemes for eliminating the Penns Neck area traffic signals at Washington Road (CR571), Fisher Place and Harrison Street and replacing them with a single grade-separated interchange in the vicinity of Washington Road and Harrison Street. The alternatives were evaluated in detailed Technical Environmental Studies prepared in 1985-1986. NJDOT's community outreach efforts for the Penns Neck Area project began in the mid-1980s, through informal meetings with local officials and members of the community. At the time, public outreach efforts by NJDOT led to the selection of a preferred alignment and conceptual alignment schemes developed by NJDOT were presented to the community.

In 1994, NJDOT conducted project-related studies, including an alternatives analysis, interim improvement studies, an environmental constraints study and a hazardous waste screening. These studies were undertaken to identify existing characteristics within the Penns Neck area that would be factors in the selection of a program of roadway improvements. NJDOT completed an alternatives analysis of the original five schemes which focused on issues related to traffic, safety, engineering design standards and land use impacts. Interim improvement schemes were also developed to provide continuity in traffic flow during the construction phases of the project. The environmental constraints study involved the identification of environmental resources in the project area, including wetlands, floodplains and water bodies, potential threatened and endangered species, vegetation and wildlife resources, and known historic and archaeological sites. The hazardous waste screening task identified known or potential hazardous waste sites in the project area.

During the conduct of these studies, NJDOT initiated a public involvement process. It included information gathering meetings with governmental and regulatory agencies, as well as major landholders in the Penns Neck area, to update public officials and primary stakeholders on the status of the project and to record the comments and concerns of these entities respective of the several alternatives. Consequent to these preliminary meetings, NJDOT developed several modified schemes.

Outreach efforts broadened significantly in 1996, when some elected officials and members of the public raised a number of objections to the project. In an attempt to address these issues, NJDOT modified its plans and continued to meet with concerned members of the community.

1.4.2 Congestion Management System Study

Under the Intermodal Surface Transportation Efficiency Act (ISTEA), as defined in 450:320 (b) of the Metropolitan Planning Regulations published in the Federal Register on October 28, 1993, federal funds may only be programmed for projects such as "a new general purpose highway on a new location or adding general purpose lanes" that significantly increase capacity for a Signal Occupant Vehicle (SOV) in nonattainment areas, if the project results from a Congestion Management System (CMS) analysis meeting the requirements of 23 CFR Part 500.

A CMS is designed to document the way in which the requirements are met for programming federal funds for projects that increase SOV carrying capacity in non-attainment areas. The CMS study must examine all reasonable available travel demand reduction and travel demand management strategies for the area and demonstrate how effective these strategies can be at eliminating the need for additional SOV capacity. If the analysis demonstrates that new SOV capacity is warranted, strategies to manage the facility must be incorporated into the proposed facility.

In 1998, the NJDOT in partnership with the Delaware Valley Regional Planning Commission (DVRPC), performed a CMS study related to increasing roadway lane capacity in the Penns Neck area (Final Version adopted March 26, 1998). In the first step of the CMS process, a detailed assessment of existing and future operating conditions was initiated. Based on such conditions, the CMS study determined that the project area has insufficient capacity that severely impacts traffic flow.

CMS strategies were examined to determine if reasonable travel demand management strategies could be implemented that would eliminate the need for the SOV capacity increase. According to the study, to achieve acceptable operating conditions through the project area, a trip reduction of approximately 50% would be needed. The analysis determined that, even if all of the strategies were to be combined, the resulting total would not meet the required trip reduction threshold needed to eliminate the need for a capacity increase. The results of the analysis are summarized below and their total effect was estimated at between 4.6% and 8.5%.

Table 1-2
Summary of CMS Analysis Results

Strategy	Range of Trip Reduction
Mode Shift	2.7% to 5.5%
Car/Vanpool Pedestrian/Bicycle Improvements Transit Improvements	
Traffic Improvements	0%
Physical Improvements Traffic Signal Advanced Traffic Control	
Travel Demand Reduction	1.9% to 3.0%
Growth & Development Travel Behavior Modifications	
Total Change	**4.6 - 8.5%**

Examination of the CMS strategies determined that the most effective program in the Penns Neck area would be comprised of several complementary and coordinated strategies. Certain strategies were determined to provide a measure of operational, safety or mobility improvement as well as address public concerns. These strategies would play a role in managing the area's travel demand and complement a roadway capacity increase. The following is a brief description of the project commitments determined during the CMS process. The full text of the CMS Study is provided in Appendix B of this EIS.

Commitment #1 - Pedestrian and Bicycle Improvements. The CMS found that the removal of the traffic signals at Washington Road, Fisher Place and Harrison Street may act as a barrier for bicycle and pedestrian access across Route 1. The CMS determined that providing bicycle and pedestrian connections across Route 1 would achieve the goal of improving mobility through the project area. Finally, the CMS recommended that a feasibility study be undertaken to investigate options for accommodating pedestrian movement across Route 1, including the possible need for a grade-separated pedestrian/bicycle overpass in the Penns Neck area.

Commitment #2 - Central Jersey Transportation Forum. The CMS recommended the establishment of the Central Jersey Transportation Forum (CJTF) to examine regional traffic impacts due to planned roadway improvement projects, area development, and

transit improvements; and to improve communication and coordination between member agencies.

Commitment #3 - Ridesharing Program. The CMS recommended that current levels of funding for TMAs in the study area be continued and expanded, with an emphasis on administering and marketing ridesharing services.

Commitment #4 - Transit Service. With regard to transit marketing, the CMS recommended funding be provided to market a vanpool program and coordinate existing east-west shuttle services.

Commitment #5 - Signing Program. The CMS recommended funding a way-finding study to investigate whether a signage program could relieve congestion by more efficiently directing area motorists to destinations in Princeton. This commitment anticipated that sign construction would be funded separately, by NJDOT, as part of the Route 1 Penns Neck area roadway improvements.

Commitment #6 - Traffic Monitoring Program. The CMS recommended a traffic monitoring program be established to document the distribution of traffic prior to and following the construction of a Penns Neck area improvement.

Since the CMS was completed, NJDOT and other responsible entities have advanced Commitments 2 and 3 and partially advanced Commitment 4. With regard to Commitment 2, in January 1999, NJDOT, in partnership with The Delaware Valley Regional Planning Commission and the North Jersey Transportation Planning Authority, established the CJTF. The Forum has met quarterly since that time and continues to meet and facilitate communication and coordination between local, county, regional and state agencies and the private sector, regarding land use and transportation issues. As for Commitment 3, NJDOT has continued to fund the Greater Mercer TMA to undertake activities related to the promotion of ridesharing and transit as commute options in the Penns Neck area.

1.4.3 Environmental Assessment

NJDOT issued a Draft Environmental Assessment (EA) for the Route U.S. 1/Penns Neck Area Improvements in September 2000. The Draft EA met with significant opposition from some local officials as well as various community and environmental groups. In November 2000, then Governor Christine Todd Whitman ordered that a full Environmental Impact Statement (EIS) be prepared.

In March 2001, the NJDOT initiated a new EIS process to reassess and redefine the problem of mobility in the Penns Neck Area and its environs and to examine a full range of possible actions and alternatives to address Penns Neck area traffic congestion and mobility constraints.

NJDOT intended to assure a high level of public involvement, to facilitate the resolution of conflict and to encourage solutions consistent with Context Sensitive Design principles. The public involvement program, which was implemented throughout the 28-month scoping and EIS processes, was developed in full compliance with federal public involvement regulations and significantly exceeded NEPA requirements for preparation of an EIS. It was specifically designed as an open and ongoing process aimed at establishing and maintaining effective dialogue between interested and involved constituencies, stakeholders, and public agencies.

The program's principal objective was to facilitate open lines of communication and information-sharing, active engagement, and maximum participation of the public throughout the scoping, strategy screening, alternatives evaluation and impact analysis phases of the EIS process. This was achieved through a multi-faceted cooperative approach that involved municipal, state, regional and federal agencies, as well as a broad spectrum of interested members of the public.

1.5 Scoping

The scoping process for the Penns Neck Area EIS was developed in accordance with NEPA and additional guidance from the Federal Council on Environmental Quality (CEQ). Scoping creates opportunities for the interested public and governmental agencies to enter the earliest phase of decision-making on the project, by identifying issues and options that should be considered in the EIS before the work has progressed to a point where incorporating new ideas is difficult. In identifying key issues early, the scoping process may also serve to focus the EIS and make it a more efficient document.

The scoping phase of the Penns Neck Area EIS process began in April 2001 and ended in June 2002. The extensive outreach conducted during the scoping phase is described in more detail in Chapter 7. It included a series of 45 stakeholder interviews and listening sessions, during which more than 90 individuals shared their perspectives and provided comments. In December 2001, a Public Scoping Forum was held. More than 200 community members attended the forum and more than 160 people provided oral and/or written testimony.

In addition, a public advisory committee, known as the Partners' Roundtable, was established in June 2001. This committee, which has 32 members representing municipal, county, regional and state agencies, and a variety of environmental, community and business groups, met approximately one to two times per month throughout the scoping and DEIS phases of the process. Between April 2001 and June 2002, the Partners' Roundtable met 19 times. Each of these meetings was open to the public. Members of the public participated actively in most Roundtable discussions. Finally, a public agency scoping meeting was held in June 2002 to provide public agencies with a formal opportunity to comment on the scope of the EIS.

Input received through the interview process, at the Scoping Forum, at Partners' Roundtable meetings and the agency scoping meeting helped to shape critical aspects of the EIS process. This input was central to the development of a working problem statement which describes existing Penns Neck area conditions (see Section 1.2), goals and objectives to guide the evaluation of project alternatives (see Section 1.3), and the 19 action alternatives examined in the EIS (see Chapter 2).

1.6 Context Sensitive Design

Context Sensitive Design (CSD) is an approach to planning and designing transportation projects based on active and early partnerships with communities. While CSD is not a new concept for the New Jersey Department of Transportation, it was formally incorporated into its procedures in 1999. CSD involves a commitment to a process that encourages transportation officials to collaborate with community stakeholders, so the design of the project reflects the goals of the people who live, work and travel in the area. Such collaboration results in creative and safe transportation solutions.

The Penns Neck Area EIS process was designed to incorporate the principles of CSD. CSD principles helped to shape the overall public involvement strategy for the EIS, including the establishment of the Partners' Roundtable Advisory Committee. As previously noted, the Roundtable includes a wide range of stakeholders and community representatives. The Roundtable was charged with developing a *Working Problem Statement* and project goals and objectives, as well as helping to define the 19 alternatives and sub-alternatives examined in the EIS. Input from the public, including participants in the Roundtable process, helped provide an understanding of local issues and priorities related to the natural and built environment and enabled a thorough analysis of the Action and No Action Alternatives in the EIS.

As the EIS process advanced, CSD principles influenced the layout and design of various alternatives and provided a framework for considering how to avoid, minimize and mitigate environmental impacts in a holistic fashion. CSD formed the basis for balancing competing needs and objectives and for considering the trade-offs inherent in selecting a preferred alternative. The EIS public involvement activities solicited valuable community input and enhanced an understanding of community concerns. At the same time, members of the community had a participatory role and were educated about the alternatives and potential impacts.

Once the EIS process is complete, CSD should continue to influence project design by incorporating the input received during the NEPA process and following through on the commitments made in the EIS. Some commitments may relate directly to environmental concerns, while others may address community development, community design or community well being, from the local perspective. Commitments are likely to take the form of further consideration of specific enhancements in the community as complementary strategies, or obtaining

community input on specific design elements, such as the style, texture and coloration of construction materials, to name two common examples.

Finally, CSD principles should play a role during permitting, since permitting processes mandate evaluation of means to avoid, minimize and mitigate impacts, and require solicitation of input from relevant community representatives as a way of understanding community concerns. The engagement of the New Jersey Department of Environmental Protection and other regulatory entities as Roundtable members during the NEPA process has served to inform the agencies early in design development and is supplying valuable regulatory guidance. This ownership-building strategy will be helpful in facilitating the permitting process, if an Action alternative is selected for construction as a result of the EIS process.