

2.0 PROJECT PURPOSE AND NEED

2.1 Project Purpose and Need

The overall project purpose is to eliminate existing impediments to smooth traffic flow on Route U.S. 1 in the Penns Neck area. As one of the remaining components of the NJDOT's regional plan for improvements along Route U.S. 1, the Route U.S. 1/Penns Neck Area Improvements would give the one mile Penns Neck stretch of Route U.S. 1 the same roadway section configuration as completed elsewhere in the corridor. This uniformity is key to improving traffic mobility within the corridor and accommodating future growth.

The following project objectives correlate with the project need:

1. Operating conditions on Route U.S. 1 in the project area should be maintained or improved by the project;
2. The existing distribution of east-west traffic entering and exiting Princeton from Alexander Road, Washington Road, and Harrison Street should be maintained by the project. This objective is based on input from Princeton Borough which does not wish to change the east-west traffic flow patterns between Route U.S. 1 and NJ Route 27;
3. The project should be compatible with local, county, and regional planning initiatives;
4. The project should avoid or minimize impacts to the local community, including its residents, businesses, educational institutions, building fabric, and historic resources;
5. The project should avoid or minimize environmental impacts.

2.1.1 System Linkage

Route U.S. 1 is a land service route providing access to adjacent properties and traditionally serving as a major transportation artery linking Philadelphia, Trenton, Newark, and New York City. In recent years, tremendous increases in commercial and residential growth have been experienced along Route U.S. 1. As documented in the *Traffic Analysis Report* (Harris, 1993a), estimates of future traffic growth along Route U.S. 1 in the Penns Neck area predict an increase of approximate 200% by the design year of 2022. This growth will place additional traffic demands on Route U.S. 1 as well as other area roadways. As this growth continues, operating conditions will further degrade through the Penns Neck area causing the peak operating times to lengthen. Thus, in order to accommodate this demand, there is a need to maintain or improve operating conditions on Route U.S. 1 (Objective 1).

The Route U.S. 1 corridor is bisected by Washington Road/County Route 571 which serves as an important east-west local and regional travel route. Washington Road, Alexander Road, and Harrison Street, each contribute a portion of traffic entering and exiting Princeton. Public officials, including West Windsor, Princeton Borough, the Middlesex Somerset Morris Regional Council, and Princeton University, have stipulated that this traffic distribution be preserved by the project as much as possible (Appendix B: MSM 7/8/99; Princeton University 7/1/99; West Windsor 6/8/99 and 10/18/94 meeting minutes; and Princeton Borough 3/25/99). One element of the project is the elimination of the traffic signals at the intersections of Route U.S. 1 and Route 571, as well as Route U.S. 1 and Harrison Street. To maintain the existing distribution of traffic through the

roadway network, it is necessary to identify a through route for Route 571 and a route for east-west traffic to access Route U.S. 1. The improvement design must be aligned in a manner that would not make other routes attractive in terms of travel time or distance. It should be noted that future development growth is expected to play a major role in traffic volumes and patterns. Geometric alignment and traffic control strategies should be implemented such that traffic would not benefit from diverting their current routes. Thus, there is a project objective to maintain existing east-west traffic patterns (Objective 2).

The project should be responsive to local, county, and regional planning initiatives (Objective 3). As Route 571 is a county roadway, improvements affecting it should be consistent with the *Mercer County Growth Management Plan* which recommends reduced land access to arterial highways and the improvement of linkages among state and county highways (Mercer County, 1989). At the local level, compatibility with local master planning should be shown. As an example, West Windsor adopted an alignment relocating Route 571 on the Sarnoff and Princeton University properties and included it in their *Traffic Circulation Master Plan* (West Windsor, 1993). Major stakeholder planning efforts should also be considered. Princeton University, for one, has depicted an alignment for Route 571 on their master plan for development of their lands between the D&R Canal Park and Route U.S. 1.

The D&R Canal Park is a linear facility comprising over 60 miles. The Park forms the western border of the project study area for a distance of 0.70 miles. In addition to ensuring protection of the natural environment of the Park, the project should not interrupt the Park's function as a natural area, waterway, and linear recreation corridor. The project should utilize existing bridges to cross the Park. The project should not impede motor vehicle, pedestrian, or bicycle access to the Park. Existing parking facilities and roadway crossings at Washington Road and Harrison Street should be maintained. Thus, there is a project objective to avoid or minimize impacts to this local, linear resource (Objective 4).

The analyses in this EA/4(f) have determined that the preferred alternative would meet Project Objectives 1 through 4 in terms of system linkage:

Objective No. 1: The project would maintain or improve operating conditions on Route U.S. 1 through the elimination of the traffic signals and upgrading the project section to meet already improved sections to the north and south. The preferred alternative would eliminate the existing Route U.S. 1 traffic signals as well as the constriction at the Millstone River bridge. The improvements would provide for a consistent roadway section throughout the Route U.S. 1 corridor, thereby eliminating potential driver confusion associated with inconsistent roadway geometry. Elimination of these existing impediments is expected to stabilize peak period traffic conditions in the design year and provide uniform traffic flow as well as reduce the peak operating period. This benefit is expected to be enhanced by the provision for auxiliary traffic lanes that would move turning traffic more quickly and safely into and out of the through traffic stream. Auxiliary lanes would meet design standards for geometry and sight distance which would improve the operation of traffic weaves.

Objective No. 2 The project would preserve the existing east-west traffic connections and provide a geometric alignment as well as traffic control measures to maintain the existing distribution to Washington Road and Harrison Street. The preferred alternative

would provide connections to Washington Road as well as Harrison Street. As now, motorists would have the opportunity to select the route that best suits their travel needs. The reconfiguration of east-west through traffic patterns via a grade-separated interchange would improve the east-west flow of traffic through the Penns Neck area. All movements to access Route U.S. 1, Route 571, Washington Road, and Harrison Street would be provided.

The design year volume of through and turning traffic from Washington Road and Harrison Street can be adequately accommodated on Relocated Route 571 and the proposed interchange. The diversion of east-west through traffic to proposed Relocated Route 571 from Washington Road and the portion of Harrison Street east of the canal would dramatically reduce heavy volumes on these local collector roads and would alleviate impacts to the communities of Penns Neck and Harrison Street between Route U.S. 1 and the canal.

Objective No. 3: The project is responsive to county, municipal, and major stakeholder master planning for an east-west link in the project area. The proposed action is consistent with the *Mercer County Growth Management Plan* as Relocated Route 571 would facilitate east-west traffic movements in part due to design as a limited access arterial highway. As well, the proposed interchange at Route U.S. 1 would improve the link and traffic flow patterns between Route U.S. 1 and County Route 571. At the municipal level, the preferred alternative would be consistent with an alignment for Relocated Route 571 that was adopted by West Windsor and included in the *West Windsor Traffic Circulation Master Plan* (West Windsor, 1993).

As well, Princeton University, the major stakeholder on the west side of Route U.S. 1, has indicated that the preferred alternative is consistent with the Route 571 alignment included on their master plan for the land between the D&R Canal Park and Route U.S. 1. Moreover, in discussion with the University and Sarnoff, both stakeholders preferred to consider relinquishing land holdings as far north as possible. The University suggested that the interchange be moved north to the Logan Drive area. The David Sarnoff Research Center mirrored this suggestion that the alignment be moved as far north of their developed complex as possible to provide the maximum useable area for their future development plans. This shift would place the interchange as far north as possible, maximizing the distance between Relocated Route 571 and the Alexander Road interchange.

Objective No. 4: The project would avoid impacts to the D&R Canal Park corridor by maintaining a physical separation between the two facilities, utilizing existing bridge crossings, maintaining traffic flow distributions of those bridges, and preserving and/or improving existing park parking facilities. Tight curvature and poor sight distance on Harrison Street near the canal would be eliminated by construction of the connector road to Relocated Route 571. This improvement would benefit not only vehicular traffic but D&R Canal Park users who must cross Harrison Street.

2.1.2 Traffic Demand

The Route U.S. 1 corridor has been the focus of numerous traffic studies. The *Traffic Analysis Report* conducted as part of this project documents a detailed investigation of the existing traffic volumes and traffic forecasts in the Penns Neck Area which included

the area bounded by the following limits: Alexander Road to the south, Plainsboro Road to the north, Faculty Road to the west and South Mill Road to the east (Harris, 1993a).

2.1.2.1 Existing Conditions

Traffic studies for the Penns Neck area began with the counting of existing traffic volumes in the study area. This raw data was then reduced and adjusted to develop base year 1992 weekday traffic volumes for the AM Peak Hour, the PM Peak Hour, and Daily Volume. The *1992 Volume Adjustment Report* (Harris, 1992), details the methodologies used to develop the adjusted traffic volumes. Traffic volume counts taken during this time period did not include programmed roadway improvements such as the interchange at Alexander Road and the conversion of the Route U.S. 1 shoulder to a travel lane. See Figures 1a-b and 2a-b in Appendix E for existing traffic volume flow maps.

As part of recent studies performed by NJDOT, additional traffic count data was collected in the project area. The purpose of collecting this additional data was to verify traffic volume data developed for future conditions. The verification of traffic projections is discussed in Section 2.1.2.4, Traffic Forecast Verifications.

The existing analysis was based on the 1992 traffic volumes and roadway geometry that were present at the time of the counts. The existing roadway was analyzed according to the methods of the *1994 Highway Capacity Manual* (HCM) (TRB, 1994). The microbased Highway Capacity Software, Version 2.1 was utilized to assist with the analyses. Roadway segments and signalized intersections were analyzed for level-of-service (LOS) and are discussed below.

Route U.S. 1

The intersection at Harrison Street fails in both the AM and PM peak hours with volume/capacity (v/c) ratios of 1.23 in the AM and 1.07 in the PM. All Route U.S. 1 links in the project area operate at capacity. As discussed in Section 2.1.2.3 Capacity Restraints, the traffic signals within the project area act as restraining points metering traffic through the project area. Analytically, this metering of traffic shows better operating conditions than actually occur in the field.

County Route 571

In the AM and PM peak hours, all links and signalized intersections along Route 571 operate at a level of service of E or better. The unsignalized intersections along Washington Road operate above capacity.

A summary of the 1992 AM/PM peak hour levels of service for the roadway network are shown in the *Traffic Analysis Report* (Harris, 1993a).

2.1.2.2 Traffic Forecasts

Traffic volume counts for the Penns Neck area, taken in 1992, were forecasted to the years 2002 and 2022 where 2002 was the estimated time of construction and 2022 is the design year. The existing (1992) volumes were increased by a background growth rate, and volumes from site- specific traffic generators (planned development) were added.

The result was 2002 and 2022 demand volumes. The demand volumes were distributed over the roadway networks, and where the traffic volume exceeded the available capacity, a traffic volume restraint was applied. In this project, restrained traffic volumes are those that are controlled or metered by traffic signals or other constraints such that only a certain traffic volume may physically pass a point in a given time frame (Section 2.1.2.3). For this analysis an hour was used as the time frame. The procedures to develop demand volumes are described in detail in the *Traffic Forecast Methodology Report* (Harris, 1993b), and the procedures for restraints and redistributions are described in the *Traffic Analysis Report* (Harris, 1993a). The following is a discussion of the factors that were applied to the base year volumes to determine future volumes.

Background Growth Rate

The background growth rate is the volume growth applied to the base year volumes resulting from regional growth trends. Typically, these include population and employment growth in the region surrounding the study area. To establish the background growth rate, three factors were examined: population growth, employment growth and historical traffic growth.

The population of Mercer and Middlesex Counties is expected to grow at an annual rate of 0.64% to 1.01%. Employment in the two county region is expected to grow at an annual rate of 1.1%. Historical data indicate that background traffic growth along this corridor has typically mimicked employment growth, so an annual background growth rate of 1% was selected. Refer to the *Traffic Forecast Methodology Report* for details.

Site-Specific Traffic Generators

The Penns Neck area has on-going growth potential. This section of Route U.S. 1 is commonly referred to as the "zip strip" with the prestigious Princeton zip code of 08540. With land readily available, many corporations find this area attractive for their corporate headquarters and offices. Princeton University's presence also attracts businesses and residents to the area. Of particular importance are the University's research, office and retail developments at the Forrestal Campus in Plainsboro Township.

Local zoning laws generally allow for office/research development as well as commercial/retail and residential development in this area. Access to this area is provided primarily by Route U.S. 1. Princeton Junction Train Station also provides rail service to the area, linking it to New York and Philadelphia.

Between the base year (1992) and the design year (2022), expected development in this area included approximately 14 million square feet of office space, 1.4 million square feet of commercial and retail space and 3,000 residential units. Proposed developments in the project area were identified and the latest development data was provided by local officials. Approved traffic impact studies for local developments were used to obtain trip generation and distribution data, when that information was available. However, some projects were only in the concept stage so traffic impact studies had not yet been developed. In these instances, the *ITE Trip Generation Manual* (ITE, 1990) was used to generate development volumes. The trip distributions for these developments were derived from available distributions for nearby sites.

Many of the traffic impact studies contained reduced volumes where trip reduction strategies were warranted. For example, transit and car pooling for office developments, pass-by trips for retail developments and internal capture for mixed-use developments are taken into account for reducing trip generation. When applicable, the reduced trips were used in the development of traffic

forecasts. To generate trips for the years 2002 and 2022, the development projects were ranked. Projects with final approval or under construction were assumed to be occupied by 2002 and were included in those forecasts. Development projects with only preliminary or concept approval were included with the 2022 forecasts.

Site specific traffic generators used in the development of traffic volumes are identified in the *Traffic Forecast Methodology Report*, (Harris, 1993b). It should be noted that as part of the *Congestion Management System* study (Appendix C), the status of these site-specific generators was compared to recent estimates provided by the local municipalities. The overall estimated growth for development types was found to be on target with original estimates.

Demand Volumes

Traffic volume forecasts were developed by adding the base year volumes to the background growth traffic and traffic from site specific generators. Figures 2-1 and 2-2 graphically show a comparison of existing traffic volumes, background traffic growth, and site-specific traffic growth, and their relation to the roadway capacity. The period between 1980 and 1992 was a time of aggressive development in the Route U.S. 1 corridor. It is anticipated that these developers will continue to build as quickly as they can find new occupants, resulting in traffic volume growth that will continue to directly impact the Route U.S. 1 corridor. However, as there are few remaining large parcels of land that can support large office parks, new development is expected to be smaller in magnitude than the existing development. As development in the surrounding communities approaches build-out, traffic volume growth will moderate. Traffic volume flow maps were developed for the demand condition and are shown on Figures 3a-b through 6a-b in Appendix E.

2.1.2.3 Capacity Restraints

Much of the anticipated traffic volume growth would result from trips between work and home. This growth will have significant impacts on morning and afternoon peak hour volumes. The volume forecasts were first examined with respect to the No-Build condition, and restrained volumes were developed for the AM and PM peak hours. The restrained traffic volumes are those vehicles which may physically pass a point given the available capacity over a given time frame. The link capacity of roadways, ramps, and signalized intersections were evaluated to determine capacity restraints. While many locations within the study area were examined, the peak hour volume is controlled by just a few key restraint points. These restraint points meter traffic, essentially operating as the "choke point." Traffic operations on the out-flow side of the restraint point will perform with better operating conditions than those on the in-flow side. Table 2-1 depicts the expected capacity restraints by scenario from the controlling links or intersections in the Penns Neck network. Controlling (intersection) restraints are designated with the name of the corresponding cross street.

Table 2-1

Route U.S. 1 Penns Neck Capacity Restraints
Restraint

Scenario

Route U.S. 1

Route 571

	Northbound	Southbound	Eastbound	Westbound
2002 AM No-Build	Harrison Street	Harrison Street		
2002 PM No-Build	Harrison Street	Harrison Street		
2022 AM No-Build	Harrison Street	Harrison Street		Clarksville Road
2022 PM No-Build	Harrison Street	Harrison Street	Clarksville Road	
2022 AM Build				Clarksville Road
2022 PM Build			Clarksville Road	

Using these restraint points, traffic volume flow maps were developed for restrained conditions. These maps are shown on Figures 7a-c and 8a-c in Appendix E.

2.1.2.4 Traffic Forecast Verification

As discussed, the initial traffic studies for the Penns Neck area were performed in 1992, from which, 2002 and 2022 future traffic volumes were developed. In order to confirm that the traffic forecasts are still valid, additional traffic data was compiled and analyzed in 1997.

As part of the *Congestion Management System* Study performed for the project in 1997 (Section 2.1.5), sample traffic counts were conducted. Traffic data was collected using Automatic Traffic Recorders (ATR) at key locations over a 24-hour period. Traffic counts were performed between February and March 1997. The following are the locations where traffic volume counts were taken.

- Alexander Road between Canal Road and West Drive
- Harrison Street at Lake Carnegie Bridge
- Washington Avenue south of Faculty Road
- Route U.S. 1 north of the Millstone River
- Alexander Road at the bridge over Amtrak
- Washington Road at the bridge over Amtrak

A comparison of the 1992 traffic volume counts with the 1997 ATR counts was performed to assess the recent traffic growth over the five year period. The 1997 ATR counts indicate that traffic through the area generally increased by about 20% along Route U.S. 1 and 10% along Route 571 east of Route U.S. 1. The 1997 traffic volumes were then compared to the projected 2002 traffic volumes to ensure traffic volume projections have not been under or over estimated. The 1997 traffic volume counts were found to verify the original growth projections for 2002 and 2022 conditions.

Since the CMS study, additional turning movement counts were conducted. These counts were performed in March and November of 1998 at the intersections of Faculty Road and Alexander Road, Washington Road, and Harrison Street. In addition, ATR counts were performed along Faculty Road, Alexander Road, Washington Road and Harrison Street in March and April 1998. These traffic counts were compared to the traffic forecasts originally prepared for the *Traffic Analysis Report* using the same methodology as discussed above. The 1998 traffic counts at the intersection of Washington Road and Faculty Road, Alexander Road and Faculty Road and Harrison Street and Faculty Road were compared to the traffic forecast developed for the project using the same

methodology discussed above. At these intersections it was found that the total 1998 traffic volumes were within 2% of the original traffic forecasts during the AM Peak hour. During the PM peak hour, the original traffic volume forecasts were found to be 11% higher than the 1998 traffic counts. This difference may be due to certain site-specific developments, particularly retail development, that had not been built at the time of the 1998 traffic counts.

2.1.2.5 Traffic Analysis Findings

Traffic studies conducted along the Route U.S. 1 corridor within the project area during the design year indicate that Route U.S. 1 and its intersections are operating at capacity during peak periods. The Washington Road, Fisher Place, and Harrison Street intersections form bottlenecks for Route U.S. 1 traffic, creating queues as long as one mile or more. Likewise, traffic queues are generated along Washington Road and Harrison Street at these intersections which can extend up to one half mile or more. Thus, there is a need to remove existing impediments to smooth traffic flow (Objectives 1 and 2).

Elimination of the traffic signals at these intersections would remove the restraints to traffic flow that cause the current traffic delays and queuing experienced along Route U.S. 1, Washington Road, and Harrison Street. The concept of flow rate is very important when reviewing the operating conditions between a Build and a No-Build condition. The levels of service for Build and No-Build conditions along Route U.S. 1 are equivalent LOS "E". However, when reviewing the vehicle throughputs of the Build and No-Build conditions, the Build condition has approximately 35% more vehicle throughput. Presently, traffic movements can only occur during the effective green time of the signals. For instance, at the intersection of Washington Road and Route U.S. 1, the traffic signal operates on a 90 second cycle length. Out of that 90 seconds, only 60 seconds are provided to the Route U.S. 1 movements. Thus, out of each hour of real time only 40 minutes are available for flow on Route U.S. 1, accommodating only 1,000 vph. If the signal displayed green for a full hour, the maximum flow rate of 1500 vehicles per hour (vph) could be accommodated. With the traffic signals removed, the capacity increase that is provided by removing the restraint points is quickly utilized by the latent traffic demand. The benefit is that the duration of the "peak period" can now be reduced.

Through traffic patterns on Washington Road and the portion of Harrison Street between the canal and Route U.S. 1 would be diverted to Relocated Route 571, thus alleviating traffic congestion on these roadways. Presently the intersections of these roads with Route U.S. 1 operate at capacity conditions and would continue to do so into the future under No-Build conditions. The proposed project would enable north-south and east-west traffic patterns to move independently of one another via a grade-separated interchange. Although Relocated Route 571 would include three signalized intersections, these would be located on the new roadway and would not influence Route U.S. 1 traffic flow. Each of these new signalized intersections would operate at acceptable levels of service (LOS "D" or better) during peak and non-peak traffic periods. These traffic signals would enable traffic progression to maximize throughput, thereby minimizing potential traffic diversions. Thus, the project would meet Objective Nos. 1 and 2 by eliminating impediments to smooth traffic flow.

The project has been designed to accommodate not only immediate traffic needs, but also minimize traffic impacts associated with the future growth planned in the area

through the design year. The provision for auxiliary lanes on Route U.S. 1 and an interchange design that provides all turning movements between Route U.S. 1 and Relocated Route 571 would preserve both the existing and design year traffic patterns. Thus, the project would meet Objectives 1 and 2 as they relate to transportation demand.

2.1.3 Economic Development

Housing and employment opportunities in the project area are expected to continue to increase through the design year (Harris, 1996e). While the Route U.S. 1/Penns Neck Area Improvements are not intended to induce development, facilitation of access between municipalities as well as state, county, and municipally designated growth areas is an economic benefit that is consistent with county and municipal master plan goals for sustaining economic growth.

With regard to the State Development and Redevelopment Plan (SDRP), the project meets the Transportation policies (provided in italics) below:

- 1) *Coordination of transportation planning and project development with environmental planning. Transportation improvements should be evaluated prior to construction to ensure accommodation and protection of sensitive environmental resources.*

The preferred alternative is designed to accommodate and preserve sensitive environmental resources to the greatest extent practicable, thereby meeting the intent of this policy. The reader is referred to Section 4.0 of this EA/4(f) for discussion of environmental resources issues.

- 2) *Coordination of transportation planning and project development with the State Implementation Plan (SIP) to attain national and state ambient air quality standards within the time-frame as required by the Clean Air Act Amendments of 1990.*

The proposed improvements would conform with the State Implementation Plan (SIP) for air quality that provides guidance and policy toward meeting national and state ambient air quality standards as mandated by the Clean Air Act Amendments of 1990 (Section 4.1).

- 3) *Consideration of aesthetics during transportation system design and maintenance.*

Project and local area aesthetic considerations have been accommodated to the greatest extent possible in the project design, thereby meeting the intent of this policy. Discussion of these considerations is provided in Section 4.11 of this EA/4(f).

- 4) *Completion of intramodal and intermodal transportation linkages so that all systems function as a unified, integrated and efficient network.*

The project would remove impediments to smooth, north-south traffic flow on Route U.S. 1, and would preserve and improve east-west transportation links in the immediate project area (Section 2.1.1), thereby meeting the intent of this policy.

- 5) *Separation of regional through traffic from local traffic by improving the use of highways and bypass roads around the more congested, highly-developed areas of*

the state, with appropriate control of access to achieve the objectives of the Planning Area.

The project would effectively separate the conflicting north-south and east-west travel movements through the project area, thereby eliminating existing traffic conflicts. The proposed grade-separated interchange would facilitate controlled, safe linkages between the two corridors (Sections 2.1.1 and 2.1.4). Elimination of through traffic on Washington Road in the Penns Neck community would yield quality of life benefits to the local community, including but not limited to traffic and noise relief (Sections 2.1.1 and 4.2).

6) *Use of appropriate transportation connections to link residential areas with areas of growing employment opportunities identified in the State Development Redevelopment Plan.*

Facilitation of travel on north-south and east-west corridors in the Penns Neck area would strengthen existing links between residential areas and employment centers, the most proximate being Princeton, West Windsor, and Plainsboro (Section 2.1.1).

In addition, Public Investment Priorities Policy 1 of the SDRP states, the “highest priority should be given to infrastructure projects and programs statewide that mitigate life-threatening situations and emergent threats to the public’s health and safety.” As examined in Section 2.1.4 of this EA/4(f), accident history in the project area and the mix of motor vehicles, pedestrians, and bicyclists using project area roadways points to a need to improve safety on Route U.S. 1 and cross streets. The preferred alternative is responsive to this SDRP policy as a consistent roadway section would be provided throughout the Route U.S. 1 corridor, new auxiliary lanes would divert turning traffic out of the through traffic stream, auxiliary lanes would meet design standards for geometry and sight distance which are intended to improve the safety of traffic weaves, and roadway sections for Relocated Route 571 and its intersections with Washington Road, the Connector Road, Harrison Street, and the interchange ramps would meet the NJDOT design standards for geometry and sight distance.

Finally, the Transportation Policy Objective for SDRP Planning Area 2, in which the project is located, encourages links between Centers, Metropolitan Planning Areas, and major highway and transit corridors by “emphasizing the use of public transportation systems and alternative modes of transportation.” A key element recommended as a result of the CMS Study is the provision for bicycle and pedestrian access across Route U.S. 1 (Section 2.1.5 and Appendix C). Recognizing that the Route 571 corridor is utilized by bicyclists and pedestrians originating east of Route U.S. 1 and destined for locations west of Route U.S. 1, and vice versa, a recommendation was made for a pedestrian/bicycle crossing between Washington Road and the Dinky Railroad crossing. NJDOT is committed to studying a location for this crossing if found acceptable by the local communities. This provision eliminates the existing at-grade crossing movement, which is dangerous for motorists, bicyclists, and pedestrians. Thus, the project would be responsive to this SDRP Policy Objective.

The general goals of the *Mercer County Growth Management Plan* encourage safe, efficient and economical transportation links with population, employment, trade, public services, and recreation opportunities. As a Regional Growth Area, West Windsor

warrants transportation improvements to accommodate existing and future area growth. As described in Section 2.1.1, the proposed Penns Neck Area Improvements would be consistent with the county goals by improving the existing north-south and east-west transportation links, and simultaneously alleviating localized traffic congestion.

The *West Windsor Township Master Plan* contains a Circulation Goal which seeks to develop a coordinated road system enabling the safe and efficient movement of people and goods. The *Township Master Plan* contains recommendations for a new County Route 571 alignment to improve access of local traffic. The new route is included in the Master Plan as a part of a peripheral road system which would carry the bulk of traffic from the region and other municipalities through West Windsor. In addition, the *West Windsor Master Plan* includes goals for the Capital Road Improvement Program II, which states that improvements to Route U.S. 1 and County Route 571 should take priority over any other transportation corridors in the Township based on the criteria of

"proximity to job base, housing opportunities for mixed income levels (affordable housing), proximity to transit services, high road volumes, location within an approved sewer service area, and consistency with state/county plans for corridor centers which are proposed to receive high funding priority from state and county governments." (p. 11, Circulation Plan Element of the *Master Plan of West Windsor Township*)

The project is responsive to these township goals by providing the desired peripheral route for Route 571, improving local and regional traffic movements within the project area and access to and from Route U.S. 1 (Section 2.1.1).

The *Plainsboro Township Circulation Plan* includes provisions for improvements to the roadway system to better respond to traffic demands, grade separations and access restrictions, and the widening of Route U.S. 1 so as to facilitate through traffic flows. The proposed Penns Neck Area Improvements are responsive to these provisions, primarily in the plan to widen and unify the roadway section to meet the recently completed Route U.S. 1 section in Plainsboro. As a consequence, traffic flow on Route U.S. 1 between West Windsor and Plainsboro would be facilitated, and the *Township Circulation Plan* goals met.

Included in the *Princeton Community Master Plan* (which includes both township and borough) are provisions for improvements to access points to West Windsor, particularly during peak traffic periods. As well, *Princeton Community Master Plan* envisions the emergence of new corridors that will connect activity centers, and major road improvements to accommodate existing and future traffic demand. The project is responsive to these master plan provisions by preserving the existing east-west corridor traffic distribution and eliminating impediments to traffic movement, particularly during peak traffic periods (Sections 2.1.1 and 2.1.2).

Princeton University plans to develop its properties east of the D&R Canal in West Windsor for future campus expansion. Recognizing the plan for Relocated Route 571 in the *West Windsor Circulation Plan*, and pursuing their desire to maximize their landholdings for future campus development, the University incorporated the alignment of Relocated Route 571 from the *West Windsor Circulation Plan* into their own Master Plan. The alignment of Relocated Route 571

presented in the preferred alternative that is the subject of this EA/4(f) is equivalent to that shown on their Master Plan. Consequently, the project is compatible with the University's Master Plan (Section 2.1.1).

In view of the foregoing discussions, the project meets Objective No. 4 in terms of economic development.

2.1.4 Safety

NJDOT performed an accident analysis along Route U.S. 1 between mile post 11.08 (vicinity of the Dinky Railroad) and mile post 12.21 (north of Plainsboro Road). The analysis performed indicates that 58% of all accidents which occurred in a three year period between January 1993 and December 1995 occurred between two passenger cars traveling in the same direction in the daylight with dry and clear roadway conditions. Such accidents are the result of stopping and starting motions, as well as weaving in approaches to traffic signals. In addition, when looking at the overall accident rate for Route U.S. 1 through the project area, it was found that the rate of accidents per million vehicle miles (accs/mvm) were 35% higher through this section of roadway as compared to a state wide average of similar facilities.

The Route U.S. 1/Penns Neck Area Improvements would include provisions to reduce the potential for accidents within the project area. The number of traffic signals within a section of roadway is in direct relation to the number of accidents. The more traffic signals, the higher the accident rate. This project plans to eliminate the traffic signals along Route U.S. 1 thereby potentially reducing the overall accident rate and improving travel mobility through the project area. As a whole, project improvements would also provide for a consistent roadway section throughout the Route U.S. 1 corridor, thereby eliminating potential driver confusion associated with inconsistent roadway geometry (meeting Project Objective No. 1). New auxiliary lanes would divert turning traffic out of the through traffic stream. Auxiliary lanes would meet design standards for geometry and sight distance which are intended to improve the operational condition of traffic weaves. As well, roadway sections for Relocated Route 571 and its intersections with Washington Road, the Connector Road, Harrison Street, and the interchange ramps would meet the NJDOT design standards for geometry and sight distance.

Recognizing that the Route 571 corridor is utilized by bicyclists and pedestrians originating east of Route U.S. 1 and destined for locations west of Route U.S. 1, and vice versa, an accommodation has been made in the project design to evaluate the feasibility of an east-west pedestrian/bicycle crossing of Route U.S. 1. If feasible, such a crossing would be incorporated into the project.

As the proposed project incorporates the foregoing measures to enhance transportation mobility, the project meets Project Objective No. 1 as it pertains to safety. Traffic safety data is included in Appendix E.

2.1.5 Congestion Management Systems Analysis

In conformance with the federal requirements pursuant to the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, a *Congestion Management Systems* (CMS) Analysis was performed for this project. The text of this document is provided as

Appendix C of this EA/4(f). The purpose of the CMS was to evaluate the existing physical and operating conditions of Washington Road and Route U.S. 1, and forecast and analyze future conditions and operational characteristics for the year 2022. A full range of traffic management strategies was evaluated to assess their ability to meet the need of the forecasted increase in congestion. The CMS study analyzed such strategies and the impact they would have on congestion, while recommendations were developed to provide support in managing future congestion.

The findings of this study validate the need for roadway improvements in the Penns Neck area to allow the roadway network to function more effectively now and in the future. Reasonable travel demand strategies were examined as a group and were determined to be able to provide only a 5% to 9% trip reduction, whereas achieving acceptable operating conditions would require a trip reduction of approximately 50%. Thus, roadway improvements are required to achieve acceptable operating conditions. However, any strategies that were investigated and determined to be feasible and appropriate for the project area have been recommended for inclusion as complementary to the project under the CMS process. Such strategies would serve to aid in managing the proposed facility and prolong the life of the project investment. Major conclusions of the CMS analysis are as follows:

1. Route 571 is an important roadway in the regional transportation network. The corridor is residential and commercial in character and supports trip activity for area residents and businesses.
2. Through the Route U.S. 1 corridor approximately 70% of the vehicles have only 1 occupant. Estimates show approximately 12% of commuters are presently in some form of carpool.
3. Route U.S. 1 carries substantial traffic volumes. Peak hour operations are characterized by volumes which exceed capacity. The result is poor levels of service, low travel speeds and long delays. Other off peak periods, also encounter congestion and delays.
4. The growth trends are anticipated to result in significant increases in traffic demand over the next 20 years through the project area.
5. Comparison of 1992, 1997 and 2002 traffic volumes validate the traffic forecasts developed as part the traffic studies performed for the project.
6. Physical conditions along Route U.S. 1 hamper the roadway's ability to function as a regional and local travel facility. Traffic signals along Route U.S. 1 operate at oversaturated conditions.
7. The study findings verify conclusions reached in previous studies of the Route U.S. 1 corridor. The congested conditions are projected to continue and that a capacity increase is needed.
8. Travel demand strategies were determined to provide only a 5% to 9% trip reduction, whereas achieving acceptable operating conditions would require a trip reduction of approximately 50%.

9. The CMS assessed a full range of strategies to determine the potential to improve mobility in the Penns Neck area. Certain strategies were determined to provide a measure of operational, safety, or mobility improvement. These included, for example, computerized signal systems and park-n-rides, which have been either programmed for construction prior to the CMS or are recommended in the CMS. However, the level of improvement which could be expected from the strategies explored, either alone or in combination, would not adequately address future year capacity needs in the project area. Other strategies, such as increased bus service and an interim stop along the Dinky, were judged not to have an immediate, sizable, or long-term benefit. Thus, a capacity increase was determined to be unavoidable.

The CMS recommendations are as follows:

1. A capacity increase is necessary in the Penns Neck area to allow Route 571 and Route U.S. 1 to function more effectively now and in the future.
2. Incorporate findings from the Route U.S. 1 Bicycle and Pedestrian Corridor Case study as it relates to the proposed project.
3. Provide pedestrian accommodations along the proposed improvement from Washington Road in the vicinity of Princeton Junction train station to Washington Road at the D&R Canal.
4. Provide paved shoulders along the proposed roadway for bicycle use.
5. Investigate potential locations for a Route U.S. 1 pedestrian crossing. As part of this investigation, commitments to providing adjoining access to the facility should be investigated.
6. Initiate a Central Jersey Transportation Study. This study would address a number of issues facing Central New Jersey, such as the need for better traffic management, truck traffic, and key roadway projects. The study would result in a transportation action plan and priority of projects for NJDOT and the counties/municipalities to form a mechanism to aid in the decisions made at both the state and local levels.
7. Continue to provide current levels of funding for local Transportation Management Associations to administer and market services affecting ridesharing and transit usage.

2.1.6 Summary of Environmental Impacts

Section 4.0 presents an examination of existing environmental conditions, project impacts, and proposed mitigation measures. The results of this assessment, which are summarized in Section 4.17, demonstrate that the project avoids environmental impacts where possible. Where unavoidable impacts occur, appropriate mitigation measures will be taken. Consequently, the project meets Project Objective 5.

