

NJTPA STRATEGY EVALUATION

**REGIONAL
TRANSPORTATION
NEEDS –
TECHNICAL
REPORT**

North Jersey Transportation Planning Authority, Inc.
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1. Introduction

Identifying transportation needs of all places in the NJTPA region is a primary objective of NJTPA's Strategy Evaluation, a comprehensive planning effort to ensure that appropriate accessibility and mobility strategies are in place to support a smooth flow of passengers and goods within the region. This report describes how Strategy Evaluation identifies place-based transportation needs in the 13-county region of northern New Jersey. In addition to showing where those needs are, it discusses the implications of the needs for the subsequent steps of Strategy Evaluation.

Strategy Evaluation is conducted periodically to assess how well the region's transportation system meets residents' needs. The effort also generates recommendations for specific strategies and programs to benefit particular places. Instead of following the conventional practice of fixing transportation problems on the network, it adopts a "place-based" approach that integrates travel patterns of people in different places to the transportation network.

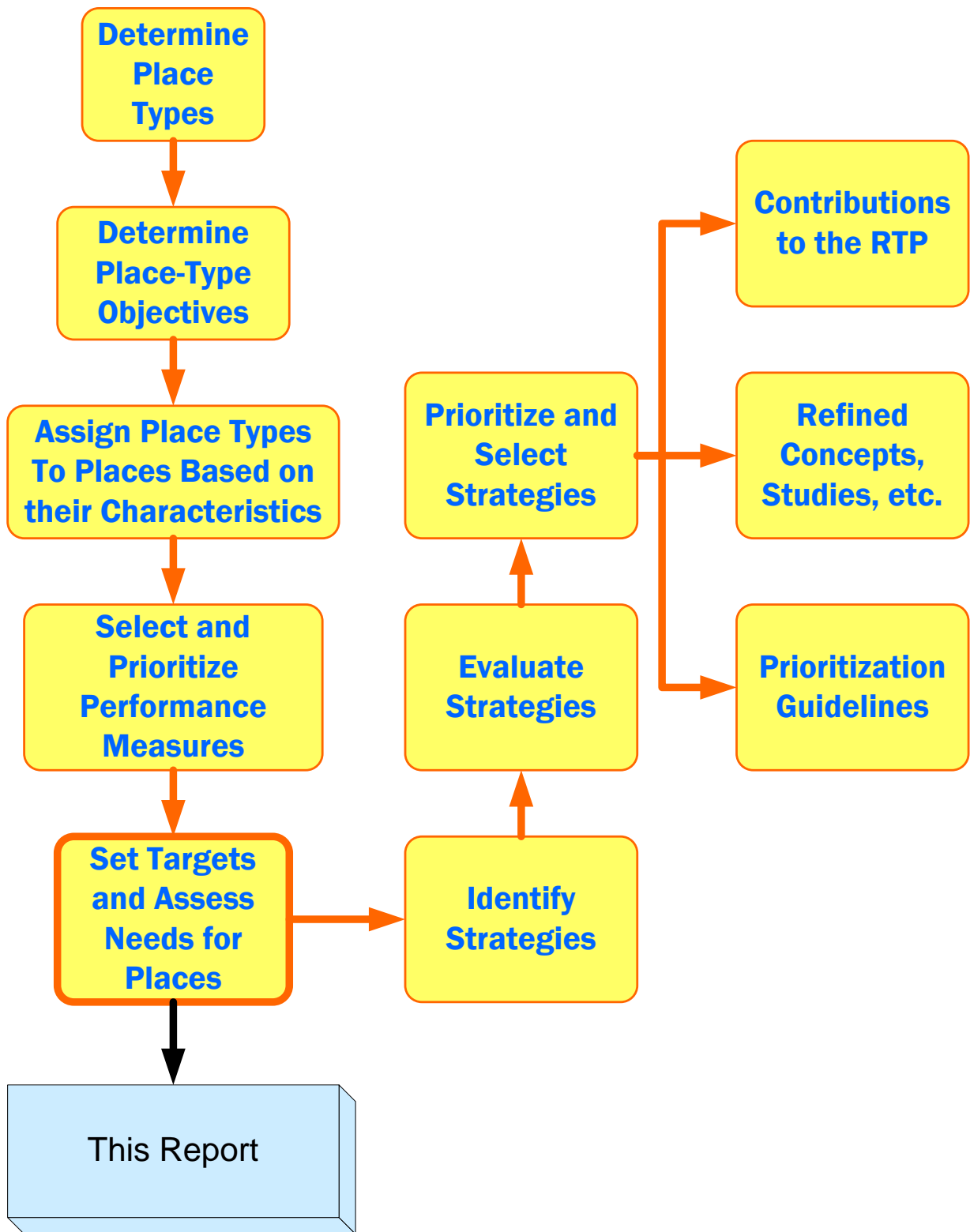
Strategy Evaluation first identifies transportation needs in all the places of the region on the basis of their specific characteristics, including the quality of transportation systems. Performance measures are used to gauge accessibility (how readily people and goods can reach desired destinations), mobility, congestion, reliability on roads, as well as the use of public transit and other travel modes. A comparison of performance measures to pre-set targets across places provides an indication of place-based needs.

The "places" considered by Strategy Evaluation are mostly municipalities, but due to their complex land use patterns, a few municipalities have been broken down to form two or three places. Transportation needs are defined as problems and opportunities for improvement. An example of a problem might be the extreme congestion experienced by residents of Old Bridge in Middlesex County. An opportunity could be a place's conduciveness to a particular mode, such as Jersey City's high residential density making it attractive to mass transit.

The strategy evaluation process and its products are shown in Figure 1. It shows the process by which the transportation needs described in this report were obtained and how they will be tied to the subsequent steps of the Strategy Evaluation process.

In correspondence with the major tasks involved, this report is divided into eight broad sections. Section 2 describes why and how place types were used to categorize places within the region into homogenous groups and what the characteristics of these place types are. Section 3 describes why and how planning objectives for various place types were set on the basis of the place-type characteristics. Section 4 describes the transportation performance measures used and their importance in analyzing transportation needs of places. Section 5 describes how targets for performance measures were set for places of different types. Section 6 describes how needs were measured in terms of different performance measures. Section 7 includes some key observations from the analysis of needs. Section 8, the concluding section, dwells on the implications of the observed needs of places and defines how these needs will be used in the subsequent steps of Strategy Evaluation.

Figure 1. The Strategy Evaluation Process and Products



2. Place Types

With 13 counties, 384 municipalities and a population of 6.6 million, Northern New Jersey is one of the most diverse regions of the country. Its economic activities range from large multinational companies and massive ports to local activities like independent retail stores. The region contains virtually all types of land uses, ranging from high-density urban centers to sparsely developed rural areas, and its population is one of the most racially and ethnically diverse in the nation. Despite containing a large proportion of low-income households, the region's average household income is higher than most large metropolitan regions of the country. Public transit use in the region is relatively high, yet most trips are still made by automobiles. The region contains large environmentally sensitive areas close to developed lands, adding to its complexity. Obviously, identifying transportation needs is no easy task in a diverse and complex region like Northern New Jersey.

A place for this study is a municipality, although exceptions were made in a few cases. Since a few municipalities of the region are extremely large, and some are too diverse in land uses to be considered one homogeneous type, a few municipalities were broken down to smaller parts. For example, the City of Newark was broken down to two parts and Jersey City was broken down to three parts. As a result of these adjustments, the number of places increased from 384 to 397.

For any comprehensive planning to be effective in a heterogeneous region like northern New Jersey, it is necessary to divide the region into homogenous groupings so that distinct and appropriate objectives can be set for each grouping. For example, the planning and transportation objectives of a heavily urban area like Newark are obviously different from a rural town like Sussex or a suburban place like Roxbury. Grouping of places into homogeneous types allows an opportunity to set objectives that are highly specific to each type of place.

In addition to allowing an opportunity to set proper objectives, homogeneous grouping of places allows a meaningful comparison among places. A uniform comparison of transportation performance among all the places within the NJTPA region is not meaningful for planning purposes, but when comparisons are made among similar places, it is possible to identify problems and opportunities in different places. For example, a comparison of public transit use in New Brunswick with Hopatcong does not provide any meaningful information because one is a large city and the other a suburban area with very different socio-demographic and land use characteristics, whereas a comparison of New Brunswick with Paterson, another large city, reveals which city is relatively better off in terms of transit share.

Finally, grouping of places into place types is essential because it allows application of specific strategies to each place type. Although some transportation strategies are more universally applicable than others, the effectiveness of strategies usually varies widely from one place type to another. For example, a transit enhancement strategy may be more applicable in a place like Elizabeth than a rural area like Wantage in Sussex County due to higher density in the former.

On the basis of the above considerations, 10 place types were identified, each having distinct characteristics. The factors considered to arrive at the place types were population size and density; number, type and age of housing units; number and type of jobs; planning-area designations by the State Development and Redevelopment Plan; and environmentally sensitive areas. The following

table shows the place types and the number of places of each type throughout the NJTPA region. The subsequent sections describe the place types in detail. The place-type map of the region is shown as Map 1 in **Appendix I**.

Table 1. Places Types and Number of Places within Each Type

Place Type	Number of Places
Urban Center	5
Urban Area	13
Mature Metropolitan Place	133
Metropolitan Place with Industry	12
Metropolitan Place with Office	20
Metropolitan Place with Shopping Center	12
Suburb	99
Vacation Area	19
Rural Town	24
Rural Area	60
Total	397

Urban Center



They are the five centers defined as Urban Centers by the SDRP, namely, Newark, Jersey City, Elizabeth, Paterson and New Brunswick. These centers are *entirely* within areas identified as Metropolitan Planning Areas by the SDRP.

The Urban Centers are the largest municipalities of the region in terms of both employment and population. They serve as dominant economic centers for the entire region and provide housing to a large number of households belonging to diverse demographic and socioeconomic groups. Their housing stock consists of a large proportion of multi-family units, such as apartments and town houses, and they mainly have a grid system of streets. They are served by multiple modes of surface transportation and the transportation infrastructure in these places is relatively old. They serve as transit hubs, providing direct access to different areas of the region. The diverse economic activities in these centers include offices, stores, light industries, warehouses, institutions of higher education, large hospitals, etc.

Although parts of Newark, Elizabeth, and Jersey City have been designated Metropolitan with Industry because of their massive port activities, the remaining parts of these cities are being considered as Urban Centers.

Urban Area



Urban Areas have many characteristics similar to Urban Centers, but they do not serve as significant economic centers of the region. A typical example of an Urban Area is Hoboken in Hudson County. Like Urban Centers, they have a predominantly grid street system and high residential density, their transportation infrastructure is old, and they cater to the housing needs of diverse socioeconomic and demographic populations. Like urban centers, they are served by multiple transit modes, but they do not necessarily serve as transit hubs.

Like Urban Centers, Urban Areas are also *entirely* within areas identified as Metropolitan Planning Areas by the SDRP. Urban Areas may have diverse land uses, but their residential component is the most dominant. A substantial portion of their housing stock is comprised of high-rise apartments and other multi-family units.

Mature Metropolitan Place



These places are predominantly (more than 85% of net area) located within SDRP's Metropolitan Planning Area.¹ An example of a Mature Metropolitan Place is Montclair in Essex County. Although they have diverse land uses, including local commercial and service activities, they are predominantly residential in nature. Like Urban Areas, they do not serve as economic centers of regional significance. Their housing stock is mainly comprised of multi-family and single-family houses, and their residential density is higher than newer suburban areas. Many of these places have main-street developments or town centers. Because these areas were developed decades or generations ago, their transportation infrastructure can be old. They are served by one or more transit modes.

¹ Net area means total area minus environmentally sensitive areas and parks.

Metropolitan Place with Industry



These places are located *entirely* within SDRP's Metropolitan Planning Areas. They typically serve as economic centers of regional significance. An example of this type of place is Carteret in Middlesex County. Many of these places have large ports or port-related activities and infrastructure, including warehouses and multi-modal transportation facilities. Although residential, local commercial and service activities are present, industry and warehousing are the most dominant activities in these areas.

Metropolitan Place with Office



These places are predominantly (85%) within SDRP's Metropolitan Planning Area with significant office activities that serve large parts of the region. The office activities in these places are often located in office parks or locations close to highways. Although transit services are often available, workers predominantly commute to these areas by highways. In addition to office activities, these places have retail and service activities, but they usually serve only local residents and workers. Their housing stock consists of mainly single-family homes, although they may also have small proportions of multi-family units and condominiums. A typical example of this place type is Parsippany in Morris County.

Metropolitan Place with Shopping Center



These places predominantly (more than 85%) fall within Metropolitan Planning Areas of SDRP. They contain one or more regional shopping malls, which give them regional significance. A substantial amount of residential units are to be found in these places, which are inhabited by workers who typically commute to other places. Other economic activities such as office or service establishments may also be present, but they are usually less substantial and more localized than the commercial activities of these places. A typical example of this type of a place is Paramus in Bergen County.

Suburb



Although parts of these places may fall within areas identified by the SDRP as Metropolitan Planning Area, they contain substantial portions of land identified as other than Metropolitan Planning Area, such as Suburban and Fringe Planning Area. These places are primarily residential in nature with little economic activity. Workers living in these places primarily commute to work in other parts of the region. The housing stock in these places primarily consists of single-family homes and their street system is often curvilinear. Automobile is the dominant mode of transportation. Middletown in Monmouth County is a typical example a Suburb.

Vacation Area



These places have a significant proportion of seasonal housing units and they typically contain recreational amenities such as beaches or ski resorts. They may be located in any SDRP Planning Area as long as they contain a substantial proportion of seasonal housing. A majority of these places are shore communities and/or located in the Barrier Islands, which are considered Environmentally Sensitive Areas by the SDRP. Economic activities in these places are mainly recreational in nature, but some amount of local commercial and service activities may also be present. An example of a Vacation Area is Seaside Heights in Ocean County.

Rural Town



Rural Towns are small and located *entirely* in areas identified as Rural Planning Area or Environmentally Sensitive Area by the SDRP. These predominantly residential places may contain some commercial and service activities, but they serve only the local populations and populations of surrounding rural areas. Rural towns are center-oriented and distinct from the surrounding rural areas because of their relatively compact development patterns. Examples of Rural Towns are Sussex and Franklin Boro in Sussex County.

Rural Area



Rural Areas contain a very high percentage of Rural Planning Area and/or Environmentally Sensitive Area, even though some of these places may contain insignificant proportion of areas identified as SDRP-designated Metropolitan Planning Area or Suburban Planning Area. These places have the lowest population density of all place types, and their economic activities mainly consist of farming. While rural towns are small by definition, rural areas can be of any size. An example of a Rural Area is Alexandria in Hunterdon County.

3. Place-Type Objectives

The primary reason for categorizing places into place types is to make it possible to set objectives for different places that are specific or unique to them. As the places within the NJTPA region are quite diverse in nature, setting identical or similar planning and transportation objectives for them would not serve any meaningful purpose. For example, for an Urban Center like Newark or Jersey City, one of the key planning objectives is to promote job growth, whereas a significant objective for a Rural Area like Wantage in Sussex County could be preservation of land. Similarly, for a place like Paramus in Bergen County, the most meaningful transportation objective may be to provide visitors good access to its shopping malls, whereas in a predominantly suburban residential place like Bernardsville in Somerset County, the primary objective may be to provide access to workplaces in surrounding areas.

Although NJTPA has broad policies such as the Regional Capital Investment Strategy (RCIS) and the Regional Transportation Plan (RTP) that pertain to the entire region, translating them to local areas, or places, for identifying transportation needs and strategies is a challenging task. For example, despite NJTPA's emphasis on public transportation in its RCIS, it is difficult to say in which places public transportation needs are high, or where transit strategies are appropriate, without a systematic investigation.

To the extent possible, NJTPA seeks to maintain consistency in its planning efforts with the plans and policies of its partner agencies. This study derives the objectives for the 10 place-types by integrating plans, policies and information from its partner agencies and refining broad NJTPA policies to suit place-type characteristics. Of particular significance in setting the place-type objectives was the State Development and Redevelopment Plan prepared by the Office of Smart Growth. Environmental considerations also played a key role in setting the objectives.

The planning and transportation objectives of the 10 place types are described below.

Urban Center

Planning Objectives	Corresponding Transportation Objectives
<p>1. Promote economic development and redevelopment, encourage job and population growth, promote diversity of jobs.</p>	<p>1a. Complete, repair or replace existing infrastructure.</p> <p>1b. Expand, enhance or improve transportation facilities that are essential to support population and economic growth, including regional mass transit, highways, bike/ped and freight facilities.</p> <p>1c. Promote inter-modal connections between transit and highway infrastructure.</p>
<p>2. Promote regional and local retail activities, mixed land uses at the neighborhood level, enhance diversity of housing types, promote high- and medium-density housing for all demographic and socioeconomic groups.</p>	<p>2a. Promote mass transit to support high density developments.</p> <p>2b. Improve local transit and bike/ped facilities.</p>
<p>3. Encourage the preservation of historic and cultural sites, reduce air, water and noise pollution on residents and workers.</p>	<p>3a. Exercise caution in infrastructure expansion, enhancement and improvement.</p> <p>3b. Promote non-SOV modes.</p>
<p>4. Preserve and expand green space.</p>	<p>4a. Enhance transit and bike/ped facilities to support high density resulting from preservation.</p>
<p>5. Enhance safety and security by protecting vulnerable sites.</p>	<p>5a. Promote redundancy of highway and transit network serving critical sites and for emergency evacuation.</p> <p>5b. Restrict freight traffic to regional arteries, sparing residential areas and minor roads.</p> <p>5c. Improve safety with special emphasis on non-motorized traffic.</p>

Urban Area

Planning Objectives	Corresponding Transportation Objectives
1. Promote, or at least retain, population growth, encourage infill developments.	1a. Complete, repair or replace existing infrastructure. 1b. Maintain, enhance or improve transportation facilities that are essential to promote population growth, including regional mass transit, highways, and bike/ped facilities.
2. Encourage local retail activities, mixed land use and diversity of housing types.	2a. Promote transit to support mixed land use and provide connection to Urban Centers and other transit-supportable areas. 2b. Promote and support walkability and bicycle friendliness.
3. Create and retain parks and open spaces.	3a. Provide local access to parks and open spaces.
4. Encourage the preservation of historic and cultural sites.	4a. Exercise caution in expanding, enhancing or improving transportation facilities to preserve historic and cultural sites.
5. Enhance safety and security by protecting vulnerable sites.	5a. Promote redundancy of highway and transit network for emergency evacuation. 5b. Restrict freight traffic to regional arteries, sparing residential areas and minor roads. 5c. Improve safety with special emphasis on non-motorized traffic.

Mature Metropolitan Place

Planning Objectives	Corresponding Transportation Objectives
<p>1. Retain stable population growth and maintain existing employment base but avoid developing large office complexes, encourage infill development.</p>	<p>1a. Complete, repair or replace existing infrastructure.</p> <p>1b. Maintain, enhance or improve transportation facilities to promote access to urban centers and other employment centers.</p>
<p>2. Maintain current residential character, promote local retail and mixed land uses in the town centers and add new multi-family housing where appropriate.</p>	<p>2a. Promote transit to support mixed land use activities in town centers and provide access to urban centers and other large employment centers.</p> <p>2b. Promote and support walkability and bicycle friendliness, with focus on town center areas.</p>
<p>3. Preserve historic and cultural sites, retain or expand open space and parks.</p>	<p>3a. Exercise caution in expanding or enhancing transportation facilities to protect historic cultural sites and prevent sprawl.</p>
<p>4. Enhance safety and security by protecting vulnerable sites.</p>	<p>4a. Promote redundancy of highway and transit network for emergency evacuation.</p> <p>4b. Restrict freight traffic to regional arteries, sparing residential areas and minor roads.</p>

Metropolitan Place with Industry

Planning Objectives	Corresponding Transportation Objectives
<p>1. Stabilize population and employment growth, promote economic development and reclaim environmentally damaged sites.</p>	<p>1a. Complete, repair or replace existing infrastructure.</p> <p>1b. Maintain highways in a state of good repair with special attention to infrastructure used for regional freight movement.</p> <p>1c. Promote transit access to regional labor markets with emphasis on transit.</p>
<p>2. Encourage economic development, industry, and regional trade, promote multi-level storage.</p>	<p>2a. Promote multi-modal freight facilities and movement, with emphasis on rail when feasible.</p> <p>2b. Encourage dedicated freight access.</p>
<p>3. Encourage mixed housing types and local retail.</p>	<p>3a. Guide transit and bike/ped improvements to promote or support mixed housing.</p>
<p>4. Enhance safety and security to protect vulnerable sites.</p>	<p>4a. Add redundancy to transportation network connecting major ports and airports.</p> <p>4b. Minimize truck traffic on minor roads and residential areas.</p>

Metropolitan Place with Office

Planning Objectives	Corresponding Transportation Objectives
<p>1. Promote economic development and encourage redevelopment.</p>	<p>1a. Maintain, enhance or improve transportation facilities that are essential to promote economic development, with particular emphasis on commuter traffic.</p> <p>1b. Promote transit to enhance connectivity between jobs and workers.</p> <p>1c. Promote carpooling and vanpooling, taking advantage of large employers and high concentration of jobs.</p> <p>1d. Guide transportation system to provide access to Urban Centers and other large centers.</p> <p>1e. Maximize utilization of existing highway capacity by making operational improvements and ITS.</p>
<p>1. Encourage complementary land uses such as residential and local retail around office parks or centers, accommodate diverse housing types, develop and redevelop into more compact form, and guide economic development opportunities into existing pedestrian- and transit-supportive areas.</p>	<p>1a. Promote local transit and walking/bicycling to minimize local SOV travel.</p> <p>1b. Promote shared parking facilities where opportunities exist.</p>

Metropolitan Place with Shopping Center

Planning Objectives	Corresponding Transportation Objectives
<p>1. Promote economic development with emphasis on regional retail.</p>	<p>1a. Maintain, enhance or improve transportation facilities that are essential to promote economic development, with particular emphasis on shopping trips.</p> <p>1b. Encourage highway access management at shopping malls and shopping plazas.</p>
<p>2. Develop and redevelop into more compact form, guide economic development opportunities into developed areas, increase housing density around shopping plazas or centers to enhance jobs-housing balance.</p>	<p>2a. Promote transit and non-motorized travel to support compact form.</p> <p>2b. Encourage improvement of bicycle and pedestrian facilities.</p> <p>2c. Promote shared parking facilities.</p> <p>2d. Promote carpooling and vanpooling, taking advantage of large employers and high concentration of jobs.</p> <p>2e. Maximize utilization of existing highway capacity by making operational improvements and ITS.</p>
<p>3. Conserve continuous natural systems and buffer environmental sites.</p>	<p>3a. Limit transportation system expansion to conserve open space and environmentally sensitive land.</p>
<p>4. Promote safety.</p>	<p>4a. Apply safeguards against freight traffic that is inevitable in shopping areas.</p> <p>4b. Promote safety of pedestrian and bicyclists in and around shopping complexes.</p>

Suburb

Planning Objectives	Corresponding Transportation Objectives
1. Apply growth management strategies to restrict rapid population growth.	1a. Conform transportation systems with growth management strategies.
2. Encourage local retail activities and diversity of housing stock by adding multi-family units.	2a. Encourage transit and non-motorized modes to support multi-family neighborhoods.
3. Create town center and promote growth around town center, develop and redevelop into more compact form, conserve contiguous natural systems and preserve open spaces.	<p>3a. Manage transportation facilities to promote compact form and conserve natural systems and open spaces.</p> <p>3b. Maintain, improve or enhance transportation system to provide access to nearest centers and park and ride facilities.</p> <p>3c. Promote walking and bicycling options for social and recreational purposes and to complement transit.</p> <p>3d. Optimize the utilization of existing road network by appropriately distributing traffic among different functional classes of roadways.</p>
4. Promote safety.	<p>4a. Protect communities from cut-through traffic on highways.</p> <p>4b. Restrict freight traffic to regional transportation network sparing residential areas and minor roads.</p>

Vacation Area

Planning Objectives	Corresponding Transportation Objectives
<p>1. Preserve character as vacation/leisure communities by restricting growth of year-round population.</p>	<p>1a. Manage transportation facilities to restrict growth of year-round population, promote compact form and conserve natural systems and open spaces.</p> <p>1b. Limit access to employment centers to prevent vacation areas from turning into year-round communities.</p> <p>1c. Improve reliability of highway travel, noting seasonal fluctuations in traffic volume.</p> <p>1d. Promote transit for vacationers, noting that access to employment centers is not desirable for preserving character.</p>
<p>2. Develop and redevelop into more compact form, conserve contiguous natural systems and retain productive farmland.</p>	<p>2a. Orient transportation facilities and services to compact centers.</p>
<p>3. Restrict overall job growth, but support appropriate recreational and natural resource-based activities.</p>	<p>3a. Manage transportation facilities and services to promote growth of the recreational sector.</p>
<p>4. Promote safety.</p>	<p>4a. Promote walking and recreational bicycling for vacationing populations.</p> <p>4b. Prevent freight traffic from entering these communities.</p>

Rural Town

Planning Objectives	Corresponding Transportation Objectives
<p>1. Limit population growth to already developed areas, enhance economic viability and self-sufficiency through new services and local retail, and encourage mixed land use.</p>	<p>1a. Manage transportation facilities and services to restrict population growth and conserve natural systems and open spaces.</p> <p>1b. Make transportation enhancements or improvements to make rural centers attractive to populations of surrounding rural areas for discretionary activities.</p> <p>1c. Create a pedestrian and bicycle friendly environment in already developed areas.</p> <p>1d. Promote access to nearest centers.</p> <p>1e. Promote transit, but not with an intent of enhancing access to large employment centers.</p>
<p>2. Protect natural systems and environmentally sensitive features, and protect and preserve large, contiguous tracts and corridors of recreation, forest or open space.</p>	<p>2a. Maintain and enhance a rural transportation system.</p> <p>2b. Restrict enhancements and improvements of transportation facilities and services to already developed areas.</p>
<p>3. Promote safety.</p>	<p>3a. Protect from freight and regional traffic flows.</p>

Rural Town

Planning Objectives	Corresponding Transportation Objectives
<p>1. Ensure the viability of agriculture and retention of farmland.</p>	<p>1a. Maintain a rural transportation system that allows access to rural towns.</p> <p>1b. Accommodate transfer of agricultural products to markets.</p> <p>1c. Create buffer zones near highways to preserve rural and natural character.</p>
<p>2. Discourage growth of population and non-agricultural activities, restrict population growth to already developed settlements such as villages and hamlets, create villages and encourage transfer of development rights (TDR) to avoid dispersed growth, protect natural systems and preserve large, contiguous tracts, and protect natural systems and environmentally sensitive features.</p>	<p>2a. Limit highway connectivity to already developed areas to avoid dispersed growth of activities in outlying areas.</p> <p>2b. Limit express bus and rail transit to discourage growth of commuter population.</p> <p>2c. Consider paratransit services to rural centers, but discourage service to large employment centers.</p>
<p>3. Promote safety.</p>	<p>3a. Promote safety on rural roads.</p>

4. Performance Measures

Transportation performance measures are most commonly used to assess the ease of moving goods and people on a transportation network. Highway-oriented performance measures such as travel delay and volume/capacity ratio, for example, are often used to get a sense of travel conditions on a road network. Due to increasing concerns about negative environmental impacts of transportation and undesirable growth patterns of cities and regions, some performance measures now go beyond the traditional realm of travel delay and focus on environmental and land use issues. For example, a mode shift from automobile to public transit and walking or bicycling is now considered desirable by planners seeking smart growth because of the potential environmental and land use impact of such mode shifts. Obviously, good planning would include both traditional highway performance measures and smart-growth measures because together they can provide a more comprehensive picture of a regional transportation system than either set of measures.

This study assesses needs of places in terms of six performance measures, of which three are traditional highway measures and the remaining three are smart-growth measures. The highway-oriented measures are Roadway Hotspot Delay, Unexpected Roadway Delay and Routine Roadway Delay. The smart-growth measures are Public Transit Share, Walk/Bike Share and Access to Nearby Centers. A detailed description of each of these measures is provided below.

It should be noted that the six performance measures described here were selected from a large array of performance measures. The selection of the performance measures was dependent on broad NJTPA policies (such as the RCIS), availability and reliability of data, efficiency of data analysis and feedback from NJTPA partners and subregions.

Roadway Hotspot Delay: Roadway Hotspot Delay is one of the most serious types of delay facing both automobiles and trucks; it results in stressful travel and imposes severe time and monetary costs on roadway users. In this study, hotspot delay is defined as the percent of individuals' total trip time that is spent in extreme congestion. For example, Montclair residents on average spend three minutes of a 17-minute morning trip in extreme congestion; therefore the Roadway Hotspot Delay for Montclair is roughly 18 percent. The measure is estimated separately for trips coming to and those leaving from each place. (Source: NJRTM, 2005 AM peak)

Unexpected Roadway Delay: Unexpected Roadway Delay occurs due to unpredictable events on roadways, such as accidents, stalled vehicles or unforeseen breakdowns of public utilities. Because of its unpredictable nature, it greatly frustrates travelers in addition to adding time and monetary cost to travel. This type of delay is an indicator of the transportation system's reliability.

This study uses the number of crashes on roadways that could potentially affect inhabitants of a place in their daily travel as a surrogate for overall unexpected roadway delay. As accidents are a major contributor to such delay, accident rates are a fairly representative measure of the reliability of roadway travel. For example, as the residents of Cranbury could be potentially affected by about 400 roadway crashes annually, whereas Lakehurst residents encounter 200, Cranbury's Unexpected Roadway Delay is twice that of Lakehurst. This measure is also estimated separately for trips coming into and going out of each place. (Source: NJDOT Crash Data, 2003, and NJRTM).

Routine Roadway Delay: Of the three types of roadway delays considered, this type of delay may be the least onerous because travelers can take it into account in their travel plans. It therefore imposes a more moderate amount of time and money cost on travelers. Routine delay is expressed as the travel time in excess of freely flowing travel. For example, since the residents of Toms River would have spent an average of only 13 minutes on their morning commutes under free-flowing traffic conditions, but in reality spend as much as 16 minutes, routine delay for trips coming out of Toms River is about three minutes. Like the previous two measures, this is also obtained for both incoming and outgoing traffic for a place. (Source: NJRTM, 2005 AM peak)

Access To Nearby Center: Planning for smart growth emphasizes good access to nearby centers from any place. When such access is absent, people make long trips to distant activity centers, thereby adding to vehicle miles, pollution and congestion. For example, Franklin Boro residents now average 13-mile trips because they travel to distant activity centers (such as shopping, schools or offices), but having better access to nearby centers might reduce their trip length by a few miles. Although it is desirable to minimize trip length from all places, this measure is more significant for places in the fringe areas, where activity centers are few in number. In heavily urbanized areas, destinations are already concentrated and trip lengths are relatively short. (Source: NJRTM, 2005 AM peak)

Public Transit Share/Shared Ride Use: Reducing automobile trips, especially those made by single-occupant vehicles is a key NJTPA objective. Planning for smart growth greatly emphasizes public transit and shared ride with the expectation that their increasing popularity would be associated with efficient use of infrastructure, reduced use of automobiles and preservation of natural resources and the environment. This study specifically focuses on the share of public transit use and shared rides overall. The data applied relate to commuting trips, and the transit share of a place is defined as the percentage of commutes that are made by public transit. For example, a total of about 13,500 commuting trips are made in a day from Nutley, out of which about 1,100 are made by public transit. Therefore, the share of transit trips for Nutley is around 8 percent. In the estimation, this measure was broadened somewhat to account for additional features such as access to Manhattan specifically and a rating developed by NJ Transit that takes into account of whether a place has sufficient density of population, jobs and to support transit households without cars. (a rating developed by NJ Transit). Overall, the indicator is intended to identify the places where use of transit and shared ride ought to increase. (Source: CTPP, 2000)

Walk/Bike Trip Share: Similar to public transit, increasing the walking or biking share of trips is a priority of the NJTPA. Bicycle/pedestrian share is defined as the percentage of all trips made during a day that are made by either of these “human-powered” modes. For example, since a total of about 40,000 trips are made by the residents of Metuchen during a day, of which 2,400 are made by bicycling or walking, the share of walk/bike trips for Metuchen is about 6 percent. The benefits from walking and bicycling are many. They promote health, add to the liveliness of streets and community character, complement public transit and can supplant automobile travel for shorter trips. (Source: NJRTME, 2000)

5. Setting Performance Targets

A target for a performance measure is a pre-set standard with which the existing performance of a place is compared to determine whether there is a need for improvement in performance. Targets of performance measures for different place types were set by implementing broad NJTPA policies such as the RCIS and the RTP. For example, regional economic growth and environmental protection, key objectives of both the RCIS and the RTP, were highly emphasized in setting the performance targets for place types. Similarly, smart growth, one of the key principles adopted by the RCIS, was a primary consideration in setting performance targets for places.

As discussed in the previous chapter, the six selected performance measures are of two types, smart growth measures and traditional highway measures. For setting targets of the smart growth measures, the basic assumption was that performance should improve in all places of the region, although they should be greater in some places compared to others. For example, it was assumed that the share of transit and bike/ped trips, as well as access to centers, should improve in all places, although they should improve at different rates in different places, depending on their place type and existing level of performance compared to similar places.

For the traditional highway measures, in contrast, the assumption was that performance could not or should not be improved in all places because of economic, environmental or other goals set out in broad NJTPA policies. For example, although people in even the remotest parts of the region may be affected by minor roadway congestion, due to environmental considerations (such as the protection of natural habitat, sensitive land and air quality), it was decided that it would be inappropriate to give priority to such issues in all places. Similarly, due to economic considerations (such as potential for job growth), places that serve as the region's economic engine were given a higher priority while setting performance targets than other places.

The targets for a performance measure also depended on its importance relative to the other measures. For example, Roadway Hotspot Delay was considered more important than Routine Roadway Delay because of its extreme consequences. The target for hotspot delay was accordingly set to select the worst-performing 25% of the places, whereas the target for routine delay was set to select only 10% of the places. Since unexpected roadway delay involves both time cost and psychological cost, its target was set to select as much as 30% of places.

Targets were set with due consideration of both regional and local priorities. Accordingly, the performance level of a place was compared to the region as a whole as well as places of its own type. The regional comparison was made to ensure that places with significant problems or opportunities are not eliminated merely because other places of its type have worse problems or greater opportunities. For example, if an Urban Area ranks sixth among the 13 places of its type (i.e., around 46%) and therefore does not qualify as a place with need for Roadway Hotspot Delay since it is beyond the 30% standard for this particular place type, it would still qualify if its performance level is within the bottom 30% of all places of the region (i.e., if it ranks 80th out of the 397 places of the region).

The criteria for setting targets are shown in a table in **Appendix II**.

6. Measuring Needs

A need for a place is given by the difference between the target set for a performance measure and the prevailing level of performance in that place. For example, as the target for Roadway Hotspot Delay for New Brunswick residents is 23%, but they actually spend 31% of their trip time in hotspots, the “Roadway Hotspot Delay need” for the place is $(31\% - 23\%) = 8\%$. Similarly, as the transit share target for Lyndhurst is 10.8% but its residents actually make only 9.8% of their trips by transit, it is considered to have a “high need” amounting to 1%.

When the prevailing performance level of a place is better than the target set for it, the place is considered not to have a “need” or “high need,” depending on the specific performance measure. For example, as routine delay for outgoing trips from Teaneck is 3.2 minutes whereas the target is 5.4 minutes, the place is considered not to have routine delay need. Similarly, as the share of bike/ped trips in Woodbridge is 8.8% whereas its target is 8.3%, the place is considered not to have high bike/ped need, although it is considered to have a need because of the importance of increasing bike/ped share in *all* places of the region due to NJTPA policies.

It is important to note that for the traditional highway measures, the delay experienced by the residents of a place may be due to their travel inside or outside the place. For example, when the residents of New Brunswick spend 31% of their trip time in hotspots, those hotspots could be in nearby places like Edison or Piscataway, or within New Brunswick itself. The delay experienced by the residents of a place could thus depend not only on the hotspots within the place, but also on hotspots outside the place. For example, if the travel pattern of the Piscataway residents is such that they travel almost exclusively within the place, the hotspots in nearby places would not have much of an impact on them, but if in contrast, the residents of Metuchen travel mostly outside the place, the hotspots in nearby places would add to their hotspot delay.

Although the assessment of need for all other performance measures was straightforward, multiple steps were required for assessing transit share need. In the first step, places were identified as high-need places if their existing performance level fell short of their targets. In the second step, the transit scores of all places were taken into account.² If a place did not qualify as a high-need place on the basis of the previous step (i.e., its transit share was higher than the target set for it), but it had a transit score larger than a certain level (0.72), then the place is still considered to have a high need. A total of 42 places were added on the basis of their transit score. In the final step, transit share of trips to Manhattan was considered as an additional variable because a large proportion of workers in the NJTPA region commute to that destination. If a place did not qualify as a high-need place through the first two steps, it could still qualify if its need for access to Manhattan is significantly high. A total of 13 places were added to the list of high-need places because of their transit-share need to Manhattan.

² Transit Score = $[0.41 * (\text{population per acre})] + [0.09 * (\text{jobs per acre})] + [0.74 * (\text{zero-car households per acre})]$

7. Needs for Places: Key Observations

The transportation needs for all 397 places within the NJTPA region are listed in a detailed table in **Appendix III**. The table shows place needs for each of the six performance measures. The maps corresponding with these six tables are presented in Figures 2 through 7 of **Appendix I**.

General Observations

1. Of all the 397 places within the NJTPA region, each place has at least one need, indicating that problems or opportunities for transportation improvement exist everywhere. Yet the nature of the problems and opportunities vary across place types because of differences in their land use characteristics and proximity to activities.
2. Of the 397 places, two have all six needs, 28 have five needs, 78 have four needs, 116 have three needs, 120 have two needs, and 53 have just one need.
3. Of the three traditional highway-oriented performance measures, Unexpected Roadway Delay affects the most number of places (176), followed closely by Roadway Hotspot Delay (171). Routine Roadway Delay affects the least number of places (83) because of the low priority placed on this performance measure based on planning principles and objectives.
4. Among the three smart-growth measures, high transit need is evident in 269 of the 397 places. In contrast, high bike/ped need is observed in 203 places and high need for access to center is also evident in 203 places. The number of places with high need for transit is greater than that for the other two performance measures because transit need is based on both outbound and inbound traffic as well as need for access to New York City and the Transit Score Index.
5. The fact that a significantly greater number of places show high need for the smart-growth measures than need for the traditional highway measures is a reflection of NJTPA policies, such as the Regional Capital Investment Strategy, to emphasize smart growth.

Needs by Place Types

1. Among all place types, Urban Centers (e.g., Newark and New Brunswick) have the most needs. The reason is twofold. First, roadway trips within, to and from these places experience high levels of delay due to congestion and roadway accidents. Second, these places provide greater opportunities for improvement of public transit and bicycle/pedestrian mobility due to high population and employment density, mixed land use and existing infrastructure.
2. Transit needs are generally higher in Urban Centers, Urban Areas (e.g., Hoboken), Mature Metropolitan Areas (e.g., Montclair), Metropolitan with Office (e.g., Parsippany),

Metropolitan with Industry (e.g., Elizabeth Port) and Metropolitan with Shopping (e.g., Paramus) compared to suburban and rural place types because of greater opportunities for transit accorded by high density and mixed land use. Although Suburbs (e.g., Roxbury and Randolph in Morris County) have relatively low transit need compared to urban and metropolitan place types, more than half of the places in this category still show high need. It implies that although transit enhancements are more conducive in place types with high density and mixed land use, some suburban areas may still have potential for such enhancements.

3. The need for access to centers is evident almost exclusively in Suburbs, Rural Towns (e.g., Sussex in Sussex County and Belvidere in Warren County) and Rural Areas (e.g., Tewksbury and Alexandria in Hunterdon County). The reason for high need for access to centers in these place types is that their dispersed land use pattern and lack of access to activities in close proximity compel the residents to make long trips. Greater availability of activities in close proximity through land use planning or improved transportation facilities to nearby activity centers may reduce the average trip length of these residents.
4. Roadway hotspots are prevalent in most parts of the region, although they seem more prevalent in the northeastern part, where most places bear highly urban character. Yet places affected by high hotspot delay can be found in virtually all parts of the region because of long trips made by the region's population.
5. In addition to Urban Centers, places identified as Metropolitan with Shopping Centers seem to be highly affected by Roadway Hotspot Delay. The reason for high need in these places may be hotspots on access and egress points of highways connecting shopping malls, or hotspots on other heavily used roadway segments within or outside the places. Managing access to popular activity sites within these places may assist addressing this need. Other effective strategies for addressing the need could be greater emphasis on automobile alternatives and highway operational improvements.
6. Density of accidents is significantly higher in the predominantly urban northeastern part of the region than the rest of the region. Yet a limited number of places as far as the western fringe of Sussex County and the southern fringe of Ocean County are also affected by unexpected delay due to accidents. The bulk of the places affected by unexpected roadway delay are, however, in the Northeast Corridor and the heavily urban northeastern part of the region.
7. Unexpected roadway delay due to accidents seems to affect proportionally larger number of Urban Centers, Urban Areas and Metropolitan places with Industry compared to other place types. A reason for this delay could be that a high density of travelers within the places leads to a large number of accidents. Unexpected delay is also high in Rural Towns, where people converge from vast rural areas in the surroundings. Strategies that may effectively address this need include greater emphasis on transit and other automobile alternatives, better management of accidents and incidents on highways, highway operational improvements and intelligent transportation systems (ITS).
8. Places affected by routine delay are small in number compared to other performance measures because of a relatively low priority placed on this measure. Urban Centers seem

to be highly affected by this type of delay because of perennial congestion within and around these places. Rural Towns and Rural Areas are also highly affected by this type of delay, but that is because drivers coming to and going from these places are more likely to encounter delays due to the substantial length of their trips. For example, if workers living in a rural area like Byram, Sussex County, commute 15 miles on an average compared to seven miles by workers from Clifton, Passaic County, the sheer trip length of Byram workers exposes them to more roadway delay than the latter. Potential strategies for routine delay need in Urban Centers could be promotion of automobile alternatives, highway operational improvements and ITS. For Rural Towns and Rural Areas, appropriate strategies could be reduction of trip length through land use planning or provision of better access to nearby centers.

9. Bicycle and pedestrian needs are relatively high in Urban Centers, Urban Areas, Mature Metropolitan Areas, Metropolitan with Industry and Rural Towns because they provide greater opportunities for bike/ped enhancement than other place types. However, bike/ped strategies often being local or spot-specific, they may be sporadically applicable in the other place types as well. For example, places identified as Metropolitan with Shopping Center or Metropolitan with Office may also benefit from bike/ped strategies because of their potential effectiveness in making connections between shopping malls and office complexes and surrounding residential areas.

Needs by Counties

1. With regard to needs in counties, no general pattern can be observed for the traditional highway measures, namely, Roadway Hotspot Delay, Unexpected Roadway Delay and Routine Roadway Delay. For example, in a heavily urban county like Bergen, a large proportion of places have high Roadway Hotspot Delay, but the same is also true in predominantly rural Sussex County. Similarly, both heavily urban Essex County and predominantly rural Warren County have a low routine delay need.
2. Transit need seems to be more prevalent in urban counties such as Hudson, Essex and Union compared to the relatively rural counties because of greater density, mixed land use and existing infrastructure.
3. The need for access to centers is more prevalent in the relatively rural counties such as Sussex, Warren and Hunterdon because of lack of nearby activities and/or their dispersed land use pattern.
4. Bicycle and pedestrian need is generally more evident in urban counties such as Essex and Hudson than the relatively rural counties, but the difference between the two types of counties does not appear to be as prominent as in the case of transit.

Needs by Major Corridors

1. A previous NJTPA study (*Are We There Yet?*, 2005) has shown that a higher level of delay is generally experienced by travelers on the state highways, such as Rt. 9, Rt. 17, Rt. 15, Rt.

202, and Rt. 206 compared to the interstate highways, the Garden State Parkway, and the Turnpike, although travelers experience delay in small segments of these roads also. The current study does not find extreme congestion on long continuous stretches of roads on any of the interstate highways other than I-80. The longest stretches are found on Rt. 9, Rt. 17, Rt. 18, Rt. 10, and I-80.

2. Instead of specifically focusing on actual link-specific roadway hotspots, this study considers places that are affected by hotspot delay. Analysis shows that the places affected by hotspot delay in different parts of the region are not generally clustered along particular highway corridors. Yet there are a few segments of highways with extreme hotspots that are surrounded by places with high hotspot delay need. These are (1) clusters around Rt. 9 in Monmouth and Ocean Counties, (2) clusters around Rt. 18 in Middlesex County, (3) clusters around Rt. 17 in Bergen County, (4) clusters around Rt. 35 in Middlesex County and (5) clusters around I-80 in Morris County. Yet for any of these clusters, the reason for delay may not necessarily be the hotspots on these specific segments.
3. Only a few long segments of highways can be identified where density of crashes (number of crashes per mile) is exceptionally high. They are (1) Garden State Parkway between East Orange and Clark, (2) Rt. 1 between Woodbridge and New Brunswick, (3) the Turnpike between Elizabeth and Carteret, (4) Rt. 18 from New Brunswick to Old Bridge, and (5) Rt. 82/24 from Elizabeth to Madison. Yet there are so many smaller segments of highways with high density of crashes that it is practically impossible to relate the delay experienced by people in various places to any of these segments.
4. Places that are affected by high routine delay are not clustered around any highway corridor. The substantial distance between many of the places with high routine delay need and the region's freeway system suggests that the delay may be picked up by the residents of these places through travel on lower-level roads such as arterials and collectors rather than freeways.
5. Places with high transit need are to be found in the entire eastern part of the region (practically from Beachwood in Ocean County to Alpine in Bergen County) and many other pockets further to the west. All the major highways of the region cut through or connect places with high transit need, implying that highway and transit enhancements could be complementary or alternative strategies for many of these places.
6. Bike/ped needs being local in nature have little relation to extensive highway corridors. Yet highway crossing for pedestrians and bicyclists is a major concern for all highways, particularly in places where density of population is high and where mixed land uses exist or can be promoted.
7. **The need for access to center has little relevance to extensive highway corridors because the strategies that are applicable to address this need are of significantly smaller scale than those applicable to large highway corridors.**

8. Places with Special Considerations

The needs analysis discussed in the previous sections of this report takes into account that some places in the region have features warranting special consideration. Of particular concern are environmentally sensitive areas and places with high concentration of low-income and minority populations.

To fulfill its goals for preserving the environment and the region's natural resources, the NJTPA seeks to minimize impacts on wetlands, floodplains, coastal areas, lakes, streams, rivers, dunes, beaches, parks, forests, natural habitats and other environmentally sensitive areas. The NJTPA also pays particular attention to the transportation needs of low-income and minority populations to ensure an equitable and inclusive planning process. In both cases, these special considerations are mandated by federal and state policy and regulations.

Map 8 of **Appendix I** provides a broad picture of environmentally sensitive areas and of places with a significant percentage of low-income and minority neighborhoods in the NJTPA region.

Environmentally Sensitive Areas

As shown in the map, Northern New Jersey is home to vast and diverse ecological resources, including forests, meadowlands, marshes, freshwater wetlands, historic parks and miles of exceptional coastline and barrier islands along the Jersey shore. The NJTPA takes great care to minimize and mitigate negative impacts that transportation investments can have on the natural environment. Close coordination with the New Jersey Department of Environmental Protection, the Office of Smart Growth (OSG), Department of Transportation and other state agencies charged with safeguarding the environment is essential in focusing attention on this concern.

Through the State Development and Redevelopment Plan (SDRP), the OSG provides guidance on supporting development while preserving environmentally sensitive areas. The SDRP-identified areas are included on the map, along with the three districts—the Highlands Preservation Area in the northwestern part of the region, the Pinelands Preservation Area in the south, and the Meadowlands in the northeast—designated by law for special conservation efforts. Governing bodies have been created for each of these districts to oversee growth and preservation.

The needs analysis discussed in this report considered the SDRP “Planning Area” typology and objectives, as well as the plans and policies of the three preservation districts, to assign place types to places, select performance measures, and estimate needs. Similar considerations will enter into the subsequent stages of the Strategy Evaluation, where strategies will be evaluated, prioritized, selected and refined. In this way, the recommendations of the finalized NJTPA Strategy Evaluation—including proposed concepts for transportation projects around the region—will reflect the SDRP's guidance for environmental protection and conservation of natural resources.

Low-Income and Minority Communities

To help achieve equitable transportation investments and address federal mandates for maintaining consistency of its planning with Title VI of the 1964 Civil Rights Act, the NJTPA identifies places with a significant percentage of low-income and minority neighborhoods in the region and

considers their transportation needs. It seeks a fair distribution of benefits and burdens of transportation investments among various segments of the population—an objective that helps fulfill the broad goal of “environmental justice.”

Supplementing the needs assessment discussed in this publication, therefore, was a parallel analysis focusing particularly on low-income and minority populations. The results will be integrated into the final Strategy Evaluation. Using Census data at the block group level, this analysis identified 34 places with a significant percentage of low-income and minority neighborhoods for particular attention. These places, which contain 56 percent of the region’s minority population and 61 percent of the poor, are shown in Map 8 of **Appendix I**.

While the needs estimated from the performance measures in the previous sections of this report apply to all places, low-income and minority communities often warrant further attention in transportation planning because of their unique characteristics. Such communities may have relatively low automobile ownership, below par job skills, challenging health issues, and high unemployment. Transportation needs of the identified communities were studied regarding access to pertinent activities, namely, jobs, job-training centers, healthcare facilities, childcare facilities, and drug and grocery stores. These measures of accessibility provide guidance for generating transportation improvements for these communities.

9. Next Steps

As shown in Figure 1, identification of transportation needs for places within the NJTPA region concludes only about half of the entire Strategy Evaluation process. The immediate tasks following needs identification would be identification, evaluation and prioritization of strategies for places with needs or high needs. Since needs are ubiquitous, strategies would have to be evaluated virtually for all the places of the region, although it would not be necessary to evaluate every strategy in every place. NJTPA's broad planning policies and smart-growth principles would provide guidelines for identifying strategies for different place types. Input and feedback from NJTPA partners and subregions would also be helpful.

After the prioritization of place-based strategies, a number of high-priority strategies would be further refined and developed into project concepts. These concepts would be handed off to implementing agencies for project development, or further advanced by the NJTPA in collaboration with implementing agencies. At the same time, a set of project-prioritization criteria will be developed from the analysis of needs and strategies. These criteria will replace the criteria developed on the basis of the previous Strategy Evaluation and they will be added to the complete set of criteria used by NJTPA's Capital Programming Division for prioritization of programs and projects. These criteria will be used for prioritization of projects in Transportation Improvement Program (TIP) and Project Development Work Program (PDWP).

Components of Strategy Evaluation will serve as the foundation of the 2009 update of the Regional Transportation Plan. For example, the place types and place-type objectives identified through this effort would be further refined or expanded to create visions for the region's future. They could also be used to derive planning objectives for the region.

List of Appendices

Appendix I. (Appendix1.pdf): Maps showing place-type designations (Map 1), needs of places in terms of six performance measures (Map 2 through Map 7), and places with special considerations (Map 8).

Appendix II. (Appendix 2.pdf) Table showing criteria used for setting targets of performance measures for different place types.

Appendix III. (Appendix3.pdf) Detailed tables with existing performance, target and need of places.