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New Jersey

Transportation System Preservation and Enhancement

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Technical Report

HIGHLANDS REGIONAL MASTER PLAN

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EXECUTIVE SUMMARY

The New Jersey Highlands Region includes a complex network of roads, railways and bridges and various modes of transportation, including automobile, bus, rail, truck, bicycle and pedestrian, are used to carry people and move goods throughout the Region. Numerous factors including inefficient land use patterns in the Highlands Region have led to an increased dependence on automobile travel, which has had adverse impacts on natural resources and overall quality of life. By promoting efficient land use and increasing access to a multi-modal transportation system, better protection can be offered to environmentally sensitive areas of the Highlands Region. The New Jersey Highlands Council is committed to helping shape the Region's transportation investments by integrating land use planning, resource protection, and transportation planning at all levels of government. This will require that the Highlands Council actively partner with municipalities and counties in the Region as well as with the New Jersey Department of Transportation (NJDOT), New Jersey Transit (NJ Transit), the North Jersey Transportation and Planning Authority (NJTPA) and other agencies and stakeholders.

INTRODUCTION

This technical report begins with an overview of the transportation system including roadways, rail, bus, air travel, pedestrian and bicycle. It examines the different networks both from a historical perspective while identifying current conditions and transportation facilities. The report then discusses the Roadway Capacity Assessment, which was developed based on the North Jersey Regional Transportation Model (NJRTM) in order to provide a more detailed assessment of roadway conditions and to identify major origin and destination trips generated in the Highlands Region. It reported on road capacity conditions of highways and other major roads during AM and PM peak periods. Using this data as a baseline, the model was able to assess traffic conditions, average trip lengths, and determine mobile source pollution contributions. An overview was then given of the critical relationship between land use and transportation, discussing the importance of Smart Growth principles when planning for transportation improvements in order to protect Highlands resources while encouraging economic growth. A transportation and transit layer was developed to support the Land Use Capability Zone Map (LUC Zone Map). The layer identified regional multimodal opportunities throughout the Highlands with the goal of better understanding the movement of people and goods throughout the Highlands Region, and to support the development of Regional Master Plan policies and long-term planning goals. A synopsis of the transportation funding structure was then discussed, and the report concludes with a summary of technical findings.

Figure 1, "Road Network" presents the Highlands road infrastructure by road category and the various administrative boundaries within the Region. Figure 2, "Transit Network" presents the Highlands public transit network infrastructure.

Figure 1

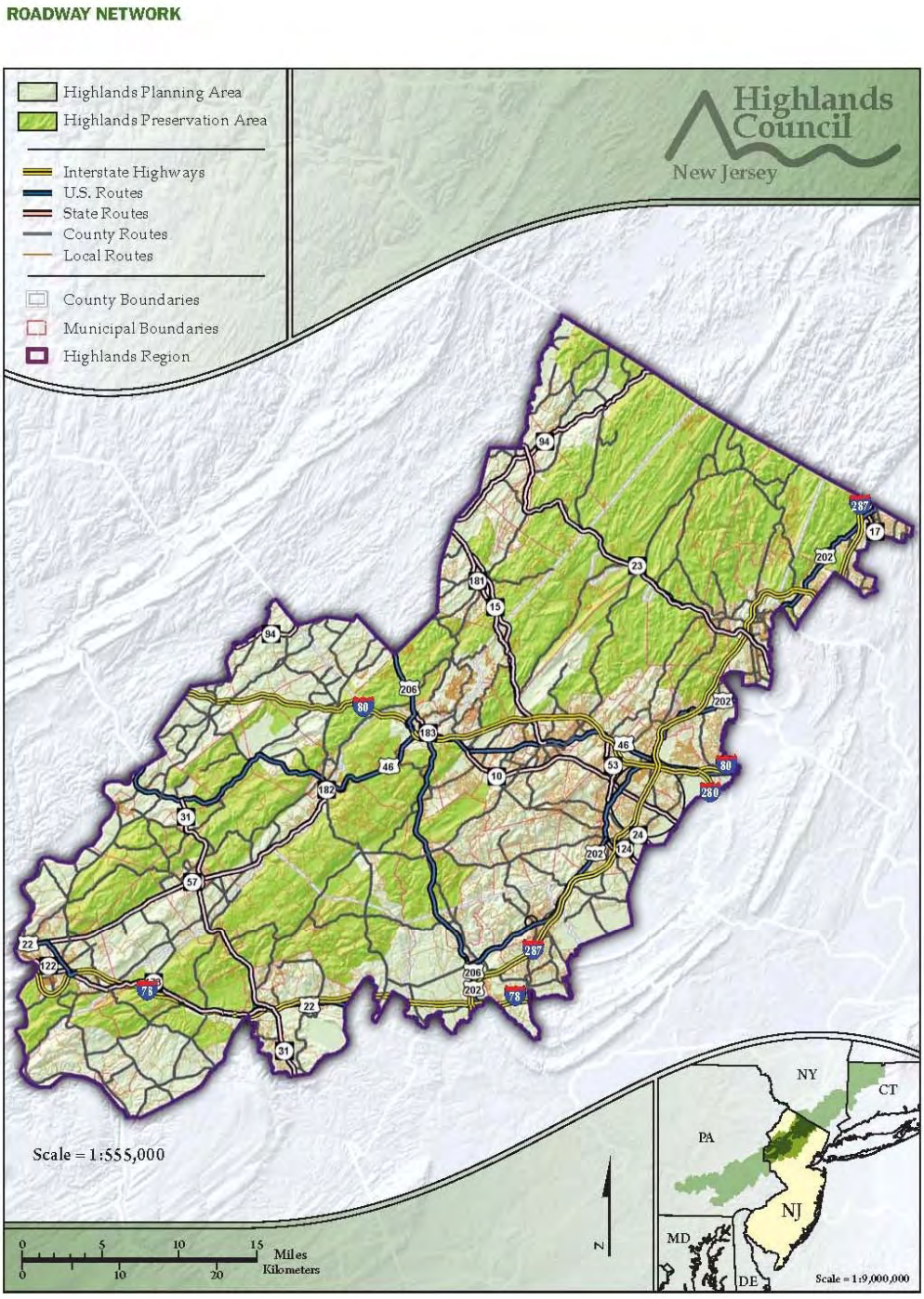
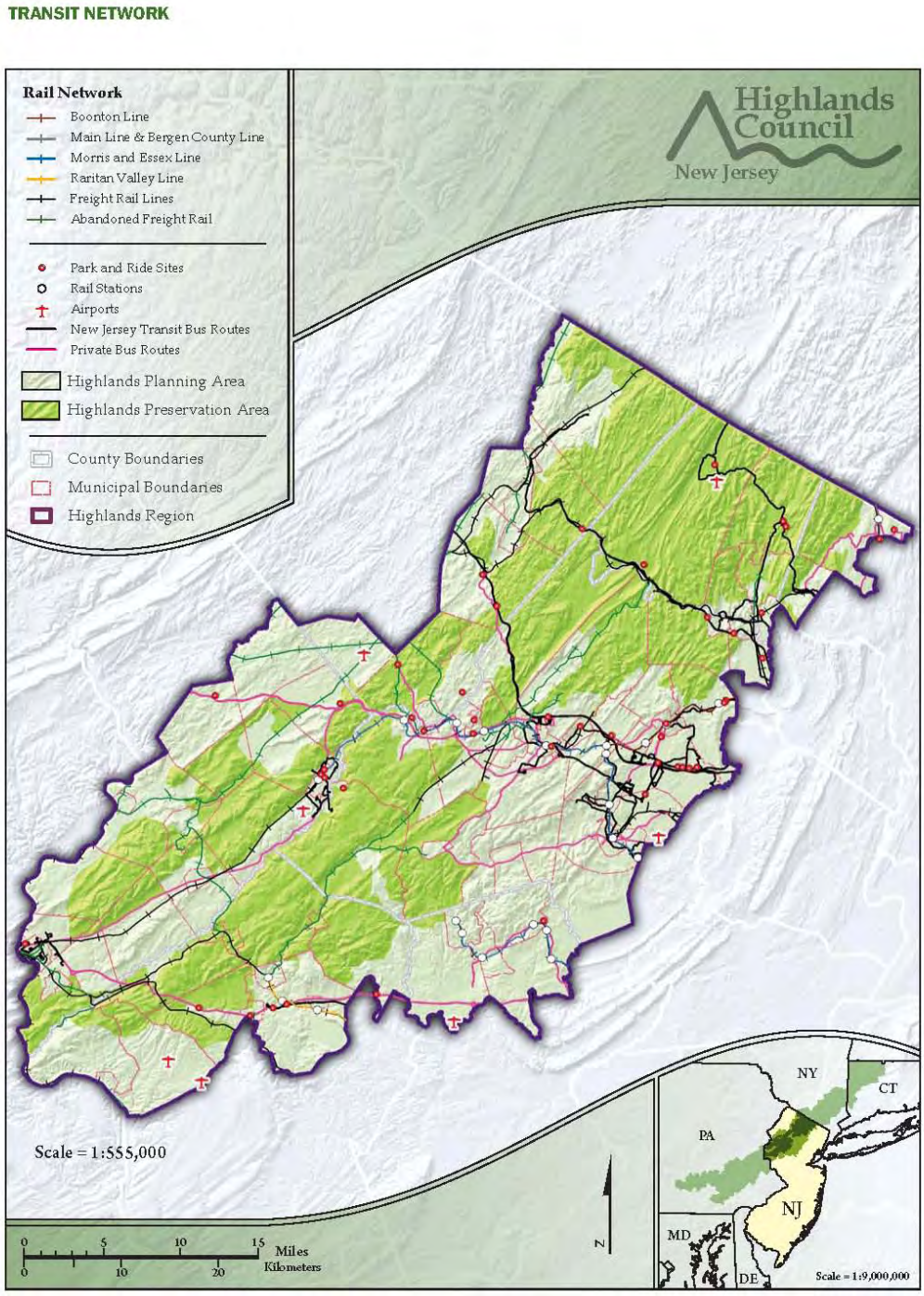

ROADWAY NETWORK
Highlands Planning Area
Highlands Preservation Area
Interstate Highways
U.S. Routes
State Routes
County Routes
Local Routes
County Boundaries
Municipal Boundaries
Highlands Region
Highlands Council
New Jersey
Scale = 1:555,000
0 5 10 15 Miles
0 10 20 Kilometers
N
NY
CT
PA
NJ
MD
DE
Scale = 1:9,000,000

Figure 2


TRANSIT NETWORK
Rail Network
Boonton Line
Main Line & Bergen County Line
Morris and Essex Line
Raritan Valley Line
Freight Rail Lines
Abandoned Freight Rail
Park and Ride Sites
Rail Stations
Airports
New Jersey Transit Bus Routes
Private Bus Routes
Highlands Planning Area
Highlands Preservation Area
County Boundaries
Municipal Boundaries
Highlands Region
Highlands Council
New Jersey
Scale = 1:555,000
0 5 10 15 Miles
0 10 20 Kilometers
N
NY
CT
PA
NJ
MD
DE
Scale = 1:9,000,000

REQUIREMENTS OF THE HIGHLANDS ACT

Section 11 of the Highlands Water Protection and Planning Act states that:

11. a. The regional master plan shall include, but need not necessarily be limited to…

> *(1)(a) A resource assessment which determines the amount and type of human development and activity which the ecosystem of the Highlands Region can sustain while still maintaining the overall ecological values thereof, with special reference to...air quality.*
>
> *(5) A transportation component that provides a plan for transportation system preservation, includes all federally mandated projects or programs, and recognizes smart growth strategies and principles. The transportation component shall include projects to promote a sound, balanced transportation system that is consistent with smart growth strategies and principles and which preserves mobility and maintains the transportation infrastructure of the Highlands Region. Transportation projects and programs shall be reviewed and approved by the council in consultation with the Department of Transportation prior to inclusion in the transportation component;*
>
> *(6) A smart growth component that includes an assessment… of opportunities for appropriate development, redevelopment, and economic growth, and a transfer of development rights program which shall include consideration of public investment priorities, infrastructure investments, economic development, revitalization, housing, transportation, energy resources, waste management, recycling, brownfields, and design such as mixed-use, compact design, and transit villages…*

TRANSPORTATION SYSTEM OVERVIEW

The transportation system is an indispensable asset that supports the economy of the Highlands Region. It facilitates the movement of people and goods through various modes of transportation. A diverse, intermodal transportation network serves a primary function in attracting residents and businesses in the Highlands Region, thus contributing to overall quality of life. An overview and historical perspective of the different types of transportation facilities in the Region including roadways, rail, bus, pedestrian/bicycle and air travel, is discussed below.

ROADWAY SYSTEM

The roadway system is comprised of various levels of roads ranging from small, local roads to limited-access interstate highways, all of which are intended to help move people and goods from place to place. Road improvements are generally intended to improve economic and social welfare of people. There is growing concern, however, regarding the major environmental impacts of road development such as degradation of ecosystems, air and water quality. It has also been shown that road improvements such as extending new roads or adding roadway capacity, rarely has the effect of reducing traffic congestion[1].

[1] Duany, Andres; Plater-Zyberk, Elizabeth; Speck, Jeff (2000). Suburban Nation: The Rise of Sprawl and Decline of the American Dream. North Point Press.

Overview of the Roadway System in the Highlands Region

The roadway system is the network which carries the largest volume of people and goods in the Highlands Region. Figure 1 divides the Highlands Road Network into five categories including: Interstate Highways (e.g. I-78); U.S. Routes (e.g. U.S. Route 46); State Routes (e.g. New Jersey Route 24); County Routes (e.g. County Route 513); and Local Roads which account for remaining roads. These categories of roadways total an estimated 5,425 miles in the Highlands Region. The vast majority of roadways fall into the category of Local Roads representing roughly 4,000 miles or 74%. County Routes represent 818 miles or 15% of total roadway miles. Interstate Highways, U.S. Routes, and State Routes each represent 237, 150 and 220 miles respectively, or 4.4%, 2.8% or 4% of total roadway miles.

Roads, Highways and Sprawl in the Highlands Region

Settlement patterns are closely defined by the available roadway infrastructure in an area. During the 1950's and 1960's, Federal and State governments invested heavily in new highway infrastructure. The Federal-Aid Highway Act of 1956 appropriated $25 billion for the construction of more than 40,000 miles of interstate highways over a ten-year period[2]. During this time the Highlands Region saw major construction and improvements made to its highway network including its three major interstate highways: I-287, I-80 and I-78. With these improvements came a shift in development patterns in the Highlands Region as people and businesses moved into more rural areas served almost exclusively by automobile. In the 1980's and 1990's, new office parks and corporate campuses opened throughout the Highlands Region rather than in traditional urban employment centers. These development patterns created and exacerbated many transportation problems such as increased traffic congestion, vast areas of impervious surfaces, greater automobile dependence, longer average commutes (in terms of time and distance), and degradation to air and water quality. As a result, many of the Region's roads and highways are at or above capacity and experience recurrent congestion.

The Highlands Act encourages preservation and enhancement of the existing roadway network as opposed to additional roadway capacity expansion, and requires that any transportation project of a State entity or local government unit that results in the construction of any additional travel lane capacity be submitted to the Highlands Council for review. Construction of new roads and highways are often motivated by concerns over levels of traffic congestion. However, studies show that in the long run, expanding new roads or adding additional lane capacity does not have the effect of reducing traffic congestion. This paradox has been observed as early as 1942 by Robert Moses, who noticed that the highways he had built around New York City in 1939 were somehow generating greater traffic problems than had existed previously. More recently, the Southern California Association of Governments concluded that traffic-assistance measures such as adding lane capacity did not mitigate Los Angeles traffic problems[3].

Overview of Transportation Studies Relevant to the Highlands region

The following is a summary of some of the ongoing or recently conducted transportation studies that are relevant to the major transportation features of the Highlands Region.

I-78 Corridor Transit Study

In response to rising congestion, the I-78 Corridor Transit Study was initiated by North Jersey Transportation

[2] U.S. Department of Transportation: Federal Highway Administration, Federal-Aid Highway Act of 1956. http://www.fhwa.dot.gov/infrastructure/rw96g.htm

[3] Duany, Andres, Suburban Nation: The Rise of Sprawl and the Decline of the American Dream, North Point Press, 2000, pp. 88-94

Planning Authority working in conjunction with NJDOT and the Lehigh Valley Planning Commission in order to assess the practicality of transit alternatives. The I-78 Corridor has experienced significant growth in population and employment and the growth is anticipated to continue into the future. Recognizing the mobility and accessibility needs of this growing population, the study examined what transit strategies that may support sustainable growth in the corridor and to enhance transit options for current and future residents. The study focused on the area between Lehigh County, Pennsylvania and Somerset County, NJ. The Study Area is generally three traffic lanes in either direction with exceptions made near congested and complex interchanges. The areas involved in the study were considered for possible locations of new bus stops or park-and-ride facilities, where possible highway or transit/park-and-ride improvements were also considered[4].

The I-78 Study area generally exhibits the design characteristics of a suburban-rural interstate. Development patterns experienced in the Study Area of the project over the last twenty years reflect a gradual increase in development density, and a particular expansion of suburban residential, commercial, and industrial activities into areas that were historically rural in character. A wide variety of planning efforts are being carried out to better understand the rapid growth along the corridor. The New Jersey Highlands Water Protection and Planning Act was cited in the Study as the most significant tool to protect the Study Area's natural resources and rural character and help to shape growth along the I-78 Corridor which is more sensitive to the needs of affected communities. The I-78 Corridor study was completed in January 2008 and a follow up study the Raritan Valley Line/Central NJ Study was initiated in late 2007 to evaluate the extension from High Bridge NJ to Phillipsburg, NJ. The Raritan Valley/Central NJ Study is anticipated to be complete in spring 2009, and will provide recommendations for potential rail stations, park and ride facilities and transit enhancement connections.

Route 57 Corridor Plan

The Route 57 Corridor Plan (Corridor Plan) conducted by New Jersey Department of Transportation (NJDOT) between 2005 and 2006 evaluated a 21-mile corridor of Route 57 between Phillipsburg and Hackettstown located entirely within the Highlands Region, traversing both the Planning and Preservation Areas. The Corridor Plan presents the opportunity to consider transportation and land use planning, prompted by the realization that through careful planning, the NJDOT could avoid the expansion of lane capacity in the corridor. NJDOT worked with local residents through a Scenario Planning Process in order to develop strategies for maintaining vitality in the corridor and creating a shared vision for the area's future growth. The results of this process were used to create land use recommendations, as well as an implementation toolkit that will include zoning and other regulatory measures, design guidelines, economic development strategies, pedestrian and transportation safety improvements, and environmental protection measures. NJDOT as part of the study implementation plan is offering technical assistance to local partners interested in implementing corridor plan concepts at the municipal level. NJDOT is also investigating a Scenic Byway designation for the corridor. For this effort, municipalities will work together on ways to preserve and enhance scenic views and historic features and capitalize on the area's potential as a tourist destination[5].

Northwest New Jersey Bus Study

The Northwest New Jersey Bus Study is a cooperative effort between the Counties of Sussex, Morris, Warren and Passaic, with project management provided by NJ Transit and the North Jersey Transportation Planning Authority (NJTPA). The study analyzes opportunities for greater access to jobs

[4] *I-78 Corridor Transit Study: Baseline Travel and Land Use Patterns* (July 2006) North Jersey Transportation Planning Authority

[5] *Route 57 Corridor Plan*: Land Use and Transportation Plan. New Jersey Department of Transportation http://www.state.nj.us/transportation/works/studies/rt57/

and other destinations via buses, shuttles and carpools. It focuses on improving bus service and intermodal connections, and will produce recommendations for more commuting options for individuals who reside or work in the northwestern New Jersey counties of Morris, Passaic, Sussex and Warren. The Study is being conducted in response to a variety of recent inquiries on improvements to transit service. The purpose of this Study is to analyze potential transit service improvements in a number of critical transportation corridors in the region including the Route 23 corridor, the Route 15 corridor and the Interstate 80 corridor. The Study is anticipated to be completed in spring 2009 and will be guided by a Steering Committee and will also include outreach through local, municipal, and county officials meetings, inter-agency meetings and public open house meetings.

TRANSIT

Transit, such as commuter rail, subway, light rail and bus, was the dominant form of transportation in the United States up until the mid-twentieth century. Following World War II, transit ridership rapidly collapsed, with the advent and affordability of the automobile and expansion of the U.S. Highway System. Between 1950 and 1955, transit ridership in the U.S. dropped by one-third, from 17.2 to 11.5 billion passenger trips annually. These trends continued into subsequent decades, with low relative transit ridership rates characterizing the 1960's and 1970's. In 1990, mass transit carried only 5.3% of commuting trips in the U.S. More recently, however, transit has experienced growing recognition as a viable alternative to automobile travel, especially as a means to relieve the roadway system of the burden of increased traffic congestion[6].

Overview of Transit in Highlands Region

NJ Transit is the statewide provider of public transit in New Jersey. There are four major commuter rail lines representing 90 miles of rail line and 24 rail stations in the Highlands Region. These rail lines, shown in Figure 2, include: Boonton Line; Main Line and Bergen County Line; Morris and Essex Line; and Raritan Valley Line. Each rail line ultimately connects to either New York Penn Station in Manhattan or Hoboken Terminal in Hoboken. The recently completed Mount Arlington Station constructed at the I-80/ Howard Boulevard intersection in Mount Arlington represents a new station on the Boonton and Morris and Essex lines, lessening demand on other stations and the I-80 corridor while also allowing passengers to combine bus and rail connections.

By reactivating existing rail right-of-ways or by acquiring new ones, opportunities will be created and may provide service to suburban areas of the Highlands Region. This is important as a means to connect the growing influx of commuters from western regions of the state and eastern Pennsylvania who currently contribute to the heavy flow of AM and PM peak period travel on the Region's major roads and highways.

The Highland Region is served by a few commuter rail lines operated by New Jersey Transit, namely, the Montclair-Boonton Line, the Morristown Line, the Gladstone Branch Line, the Raritan Valley Line, and the Main/Bergen County Line. The Main/Bergen County Line passes through an extremely small portion of the Region's northeastern part, most notably Mahwah Township, while the Raritan Valley Line serves only a small area in the Region's southern fringe. The Gladstone Branch Line in the northern Somerset County area, has a limited ridership and potential for increases. The lines that provide the greatest rail access to the Highlands are the Morristown and Montclair-Boonton Lines.

Any transit improvement in New Jersey, whether within or outside the Highlands Region, may affect the region if the magnitude of improvement is large and it affects service on the rail lines and bus routes

[6] Schrag, Zachary M. (2002) *Urban Mass Transit in the United States; Age of the Subsidy* EH.NET Encyclopedia. http://eh.net/encyclopedia/article/schrag.mass.transit.us

serving the Highlands. According to the Access and Mobility 2030 plan, the most recent Regional Transportation Plan of the North Jersey Transportation Planning Authority (NJTPA), there are currently as many as 15 transit expansion candidate projects in northern New Jersey. Some of these candidate projects are not likely to materialize into construction projects in the near future, and only a handful of them could potentially have a discernible impact on the Highlands Region.

The Highlands Region commuter rail lines are anticipated to benefit from the The Trans-Hudson Express tunnel (THE tunnel), which is an essential component of the Access to the Region's Core, or ARC project. It will improve service to New York City on all commuter rail lines in northern and central New Jersey and create new transit markets. It can be expected that as a result of the new tunnel, there will be at least a modest increase in ridership from existing stations on all NJ Transit lines connecting the Highlands, namely, the Montclair-Boonton Line, the Morristown Line, the Gladstone Branch Line, the Raritan Valley Line, and the Main/Bergen County Line. Many places within the Highlands with rail service to the New York City, especially those west of Dover, do not have opportunities for single-seat rides. With the construction of the THE tunnel, the level of service on the rail lines will improve, which in turn will make the NY City more attractive for the workers of the Highlands. To what extent the attractiveness increases will depend on the operational plan that is still under development by NJ Transit.

In addition to passenger rail, the area has a long history of moving goods by rail as well, dating back to the 17th century when the Region's first roads carried farm produce and raw materials to the State's more urban areas. The freight rail system reduces highway congestion, improves safety and protects the environment by hauling freight that would otherwise move on highways. There are roughly 150 miles of freight rail line in the Highlands Region[7]. While NJ Transit does not carry freight itself, it retains certain right of ways including the Morristown and Essex Lines which it then can lease to private rail companies which specialize in freight movement.

In order better the understanding of the goods movement issues, constraints, and opportunities facing the State, NJDOT is developing the State's first Comprehensive Statewide Freight Plan study which will serve as a communications channel between numerous stakeholders involved in goods movement in New Jersey by creating a forum for the exchange of issues, data, and other information.

There are about 240 miles of inactive passenger and freight rail lines scattered throughout the Highlands Region[8]. Some of these lines are being assessed for potential reactivation as working lines, such as the New Jersey Lackawanna Cut-Off (Lackawanna Cut-Off), or the Raritan Valley Line-Extension.

The Lackawanna Cutoff would provide rail service from New York Penn Station in Manhattan or Hoboken Terminal in Hoboken, to Scranton, PA. The project is currently awaiting final approval by the Federal Transit Administration (FTA) and funding for construction may be appropriated into the following fiscal year budget9. The project is currently being pursued in two segments. The first is a short extension to Andover and the second is the full extension from Andover to Scranton, PA. The June 2008 approval by the NJTPA Board of Trustees of a Locally Preferred Alternative for Minimum Operable Segment (MOS) of the Lackawanna Cutoff, that would extend service for 7.3 miles from Port Morris to Andover, New Jersey, signals that extension of service to this segment is imminent and may happen within a few years from now. Two New Jersey stations are proposed, in Andover and Blairstown, both of which are just to the west of the Highlands Region.

The Raritan Valley Line-Extension would reinstitute rail service along freight rail lines running from High Bridge, NJ to Phillipsburg, NJ. The study examines extending the line on the NJ TRANSIT owned

[7] Highlands Transportation Transit Network. NJ Transit Corporation (2006)
[8] Highlands Transportation Transit Network. NJ Transit Corporation (2006)
[9] Lackawanna Cutoff. New Jersey Transit; Department of Capital Planning and Programs
http://www.njtransit.com/an_cp_project019.shtml

right-of-way to intermediate points, such as Hampton Borough or Bloomsbury Borough. Extension to Phillipsburg is complicated because The Central Railroad of NJ right-of-way was severed by the construction of Route I-78. To extend the service westward to Philipsburg would require construction of a large bridge over Route I-78 or shared use of the Norfolk-Southern busy, parallel freight right-of-way. An assessment of project need and feasibility is currently being conducted as a follow up study to the I-78 Corridor Transit Study which is a committee spearheaded by the New Jersey Transportation Planning Authority.10.

NJ Transit also operates an extensive bus network in the Region by way of local and minibus services. In the Highlands Region, local bus service is most prevalent in Morris and Bergen Counties. Minibuses serve as feeders to rail stations and provide transportation to lower-density areas across the region. In addition, there are several private bus carriers including but not limited to Coach Bus, Short Line Bus, Lakeland Bus Lines and Trans-Bridge Lines which predominately run independent routes to Northeast New Jersey and New York City. Each of the seven counties in the Highlands Region also provides county-based curb-to-curb paratransit service for senior citizens and those with disabilities. Paratransit service is a form of transportation service that is more flexible and personalized than conventional, fixed-route bus services. NJ Transit assists counties as well as private non-profit organizations and municipalities through the administration of various Federal and State grant programs. Some of these programs include the Senior Citizens and Disabled Residents Transportation Assistance Program and the Casino Revenue Fund[11].

In order to make mass transit more convenient for drivers, investments have been made to develop forty park-and-ride locations in the Highlands Region, some of which are operated by NJ Transit or NJDOT. Park-and-ride facilities are characterized by dedicated parking located near transit stops or interstate corridors. The occupancy rates for eighteen rail park and ride facilities in the Highlands Region were evaluated in order to estimate the overall level of ridership. The total available parking capacity was found to be 3,000 parking spaces including NJ Transit, municipal and private lots. Out of the 3,000 spaces available, approximately 2,200 parking spaces were used yielding an occupancy rate of 73%, according to data collected from NJ Transit[12].

Providing enhanced access to public transportation for commuters while enabling communities to better serve their senior populations and others in need of mobility is the Community Shuttle Program run by NJ Transit. NJ Transit uses federal funds to purchase 20-passenger minibuses that are leased, at no cost, to municipalities and counties for use in providing shuttle service. Once communities begin providing shuttle service, they are eligible for up to $60,000 in start-up costs for the first three years of service. Applicants are eligible for the program based on their ability to operate the service, access to NJ Transit train stations and bus stops, opportunities to connect rail stations with work sites, and demonstration of local support. The Township of Bernards is the only Highlands community that participates in the Community Shuttle Program.

PEDESTRIAN AND BICYCLE

Safe and effective bikeway and pedestrian networks can significantly enhance the quality of life for residents and visitors of the Highlands Region. Biking and walking are considered to be a healthy, efficient and low cost means of transportation and recreation. Biking and walking are often the quickest way to accomplish short trips, especially when over 40% of all trips in the United States are two miles or

[10] *I-78 Corridor Transit Study: Baseline Transit and Freight Activities* (July 2006) North Jersey Transportation Planning Authority

[11] NJ Transit Corporation. (2006) *Accessible Services: County Paratransi.t* http://www.njtransit.com/-as_paratransit.shtml

[12] New Jersey Transit Corporation, Parking Guide; 2004 Edition.

less in length[13]. Comprehensive plans for bicycling and walking can assist in reducing environmental impacts of vehicular travel as well as mitigating noise pollution while identifying different modes of transportation so as to improve pedestrian and bike connections. The extensive bus and rail network of the Highlands Region can provide many opportunities to enhance pedestrian and bicycle connection through access management techniques, thus improving mobility of non-auto related travel. Improvements can also be made by establishing more pedestrian and bicycle right-of-ways, and implementing traffic calming measures in downtown areas to improve safety.

Bikeway and pedestrian plans are critical to promoting alternative modes of transportation, and are sound components of county and municipal Circulation Elements. Sound design, connectivity, safety and a fundamental understanding of the behavioral differences between bicyclists and pedestrians are key pieces to a good bicycle and pedestrian plan. Bicyclists and pedestrians differ in that bicyclists are legitimate road users while pedestrians prefer greater separation from traffic and are slower travelers. Bicyclists, however, still differ from motorists, being slower, less visible and more vulnerable than motorists. Therefore, special attention is required for high-speed roads and complex intersections.

Over the past three decades, the childhood obesity rate has more than tripled for American children aged 6-11[14]. Much of the sharp rise in the rate of obesity for children and adolescents can be attributed to design of urban and suburban environments that discourage walking. In the Highlands Region, as in other parts of the country, school-aged children are spending less time walking and bicycling to school, and more time being driven in cars and buses. Safe Routes to School (SRTS) is a federal, state and local effort to enable and encourage children to walk and bicycle to school. One major goal of the program is to assist New Jersey communities in developing and implementing projects and programs that encourage walking and bicycling to school. Another goal is to educate the public on bicycle, pedestrian and traffic safety. Each school manages its own SRTS program. The school principal or other school administrator generally has the final word on program policy and implementation.

The Highlands Region currently supports an extensive network of recreational bikeway and pedestrian paths, connecting parks and open spaces. The New Jersey Trails Plan has organized a number of these resources and others into an extensive trail system totaling 1,500 miles of marked or mapped trails on federal, state, interstate, and county lands and waterways[15]. A portion of this trail system travels through the Highlands on the Ramapo Mountain Trail System, Patriots' Path in Morris County, the Morris Area Trail System, and parts of the Sussex Branch Trail and the Appalachian Trail, as well as along the Musconetcong River. The Delaware and Raritan Canal State Park is a successful example of over sixty miles of canals that were abandoned for a period and then transformed into a green corridor, which was then designated a National Recreation Trail. The Delaware and Raritan Canal State Park can be accessed by bus, train, or car. The integration of trails and greenways with the Highlands Transportation and Transit system is an important aspect for the recreation and tourism initiatives of the region. Further details regarding Recreation and Tourism are discussed in the Historic, Cultural, Scenic and Recreation and Tourism Technical Report.

AIR TRAVEL

The Highlands Region is home to seven regional aircraft facilities: Morristown Municipal Airport in Morristown, Greenwood Lake Airport in West Milford, Hackettstown Airport in Hackettstown, Sky Manor in Alexandria, Alexandria Field in Alexandria, Somerset in Bedminster and Trinca in Green

[13] Federal Highway Administration, Summary of Travel Trends Nationwide Personal Transportation Survey; Washington, D.C.: 1995

[14] Institute of Medicine of the National Academies. (2004) *Childhood Obesity in the United States: Facts and Figures*. http://www.iom.edu/Object.File/Master/22/606/FINALfactsandfigures2.pdf

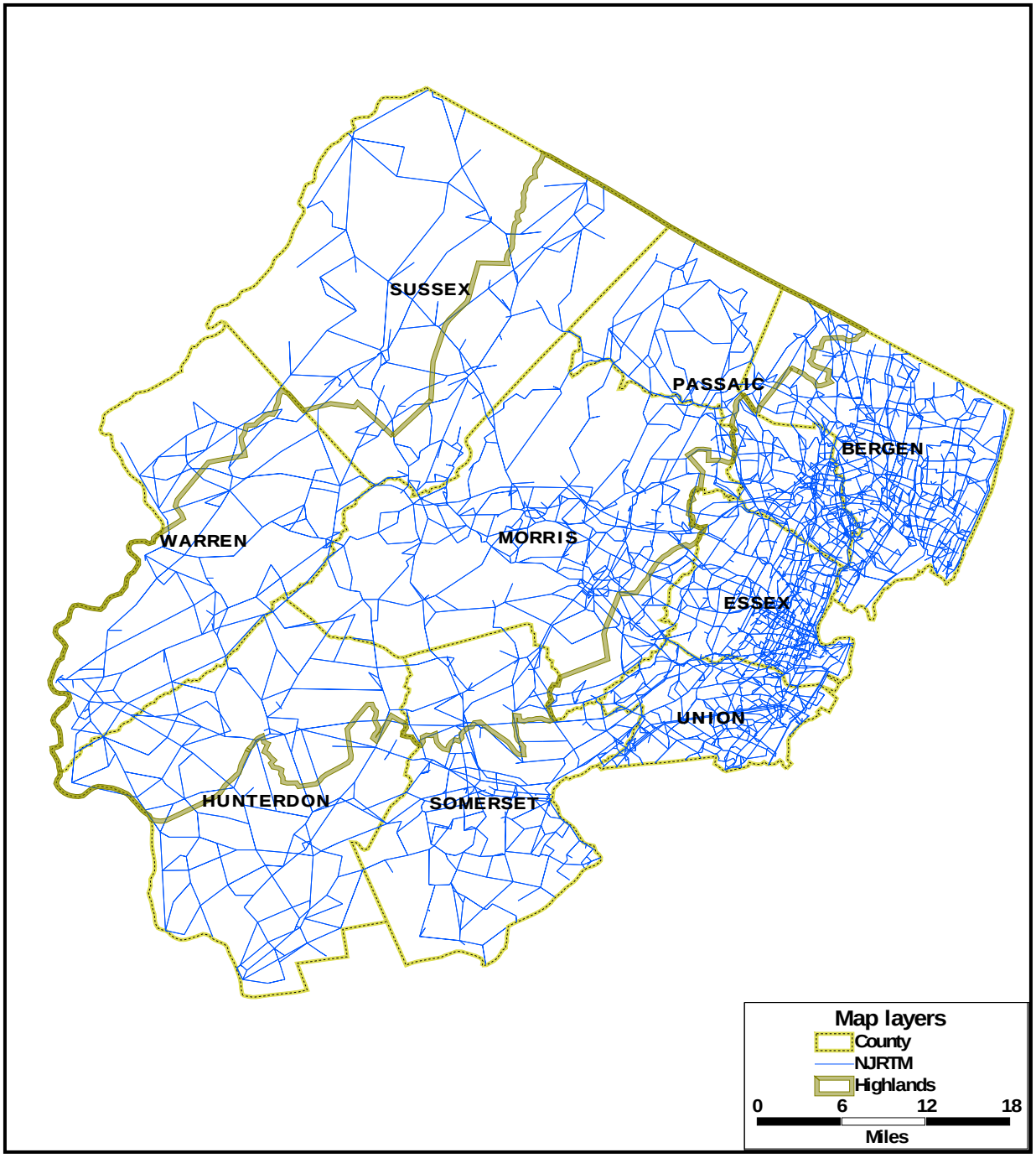
[15] New Jersey Trails Plan Organization, 1996 New Jersey Trails Plan; 1996

Township.. The runways of these airports operate in accordance with Federal Aviation Rules and are recognized in local ordinances through the Municipal Land Use Law (MLUL). The closest international airport is Newark Liberty International Airport which is located within the city limits of both Newark, NJ and Elizabeth, NJ. Newark Liberty International Airport is the largest airport serving the New York metropolitan area as well as the largest airport in the state of New Jersey. Newark Airport can be accessed by bus, rail or car from the Highlands Region. The Coach and Paddock Heliport is also available for public use and is located in Clinton, NJ.

ROADWAY CAPACITY AND PERFORMANCE

This section provides a summary of the Roadway Capacity Assessment which was used in order to establish the baseline for higher-level roadway conditions in the Highlands Region. Higher-level roadways include major roadway types such as freeways and expressways as well as most arterials; however, they include only few local roads. The complete assessment, including a more detailed explanation of the approach and methodology is attached as Appendix A. The Roadway Capacity Assessment was based on a Highlands Sub-Area model, which summarizes the existing vehicular travel patterns and traffic conditions for the Highlands Region for the base year 2002 and was developed from the larger North Jersey Regional Transportation Model (NJRTM). The NJRTM covers thirteen counties in Northern and Central New Jersey including the entire Highlands Region as shown in Figure 3. It currently is the primary analysis tool for transportation planning in the Region. The model identified major vehicle origin and destination trips generated in the Highlands Region, and reported on road capacity conditions during AM and PM peak periods.

Figure 3- 2002 NJRTM Highway Network



Note: Figure prepared for New Jersey Highlands Council

The NJRTM is based on a traffic analysis zone (TAZ) system, which is 1990 census-tract based and has 1,377 zones within the 13-county region. The TAZ's represent the land use activities in a specific geographic area represented by that zone. In the NJRTM these activities are represented in the form of population, households, number of employees by type of employment, and average household income by TAZ.

SOCIOECONOMIC DATA FOR THE BASE YEAR 2002

The socioeconomic data informing the model describes population, households, employment by type – basic (industrial), retail, and service, and average household income. This information was developed at the traffic analysis zone level for the entire Highlands Region at five-year increments between 2000 and 2030. As listed in Table 1, there are 801,914 people living within the Highlands in 291,668 households. The total number of employment within the Highlands in the base year 2002 is estimated to be 401,606.

Table 1: Socioeconomic Data Within Highlands Region - 2002 NJRTM Highway Network

County	Population	Household	Employment			
			Basic	Retail	Service	Total
Bergen	37,263	13,909	10,577	3,325	10,265	24,167
Hunterdon	59,662	20,268	7,149	3,609	14,890	25,648
Morris	399,449	145,007	78,388	35,694	137,061	251,143
Passaic	68,961	24,364	4,061	2,166	10,995	17,222
Somerset	44808	17845	9858	3249	14214	27,321
Sussex	93,104	32,825	5,133	3,277	13,373	21,783
Warren	98,667	37,450	11,889	6,968	15,465	34,322
Total	**801,914**	**291,668**	**127,055**	**58,288**	**216,263**	**401,606**

Note: Table prepared for New Jersey Highlands Council

TRIP DISTRIBUTION SUMMARY

The trip distribution patterns were analyzed and summarized into major groupings included in the model's final daily vehicle trip table. The table identifies the major origins and destinations of trips generated in the Highlands Region. The TAZ's were grouped into seven districts including:

- Highlands Region
- Western Externals going to Pennsylvania
- Sussex and Warren County portions not included in the Highlands Region
- Northern New Jersey East of Highlands Region (Bergen, Essex, Hudson, Union, etc.)
- Central and South Jersey (Middlesex, Hunterdon, Monmouth, Southern externals, etc.)
- Externals going to Manhattan, NY
- Externals going to Rockland and Orange Counties, NY

The comparison of the trip interactions to/from the Highlands are presented in Table 2. Table 3 shows the summary of travel patterns from the 2002 highway trip table at the district levels mentioned above. Table 2 shows the trip distribution summary in a graphical form. The main observations found in Table 2 are as follows:

- 72 percent of trips originate and end within the Highlands Region
- 16 percent to/from Northern New Jersey
- 4 percent to/from Central and South Jersey
- 3 percent to/from Western externals to PA
- 1 percent to/from Manhattan, NY

Table 2 - Trip Distribution Summary to/from Highlands

District		Origins		Destination	
		Trips	Percent	Destination	Trips %
Highlands	1	1,328,616	72%	1,328,616	73%
Pennsylvania	2	59,130	3%	60,657	3%
Sussex and Warren	3	21,802	1%	24,725	1%
Northern NJ	4	300,263	16%	278,847	15%
Central & South NJ	5	82,060	4%	78,797	4%
Manhattan & East	6	13,308	1%	13,056	1%
Rockland and Orange	7	27,582	2%	27,407	2%
Total		1,832,761	100%	1,812,105	100%

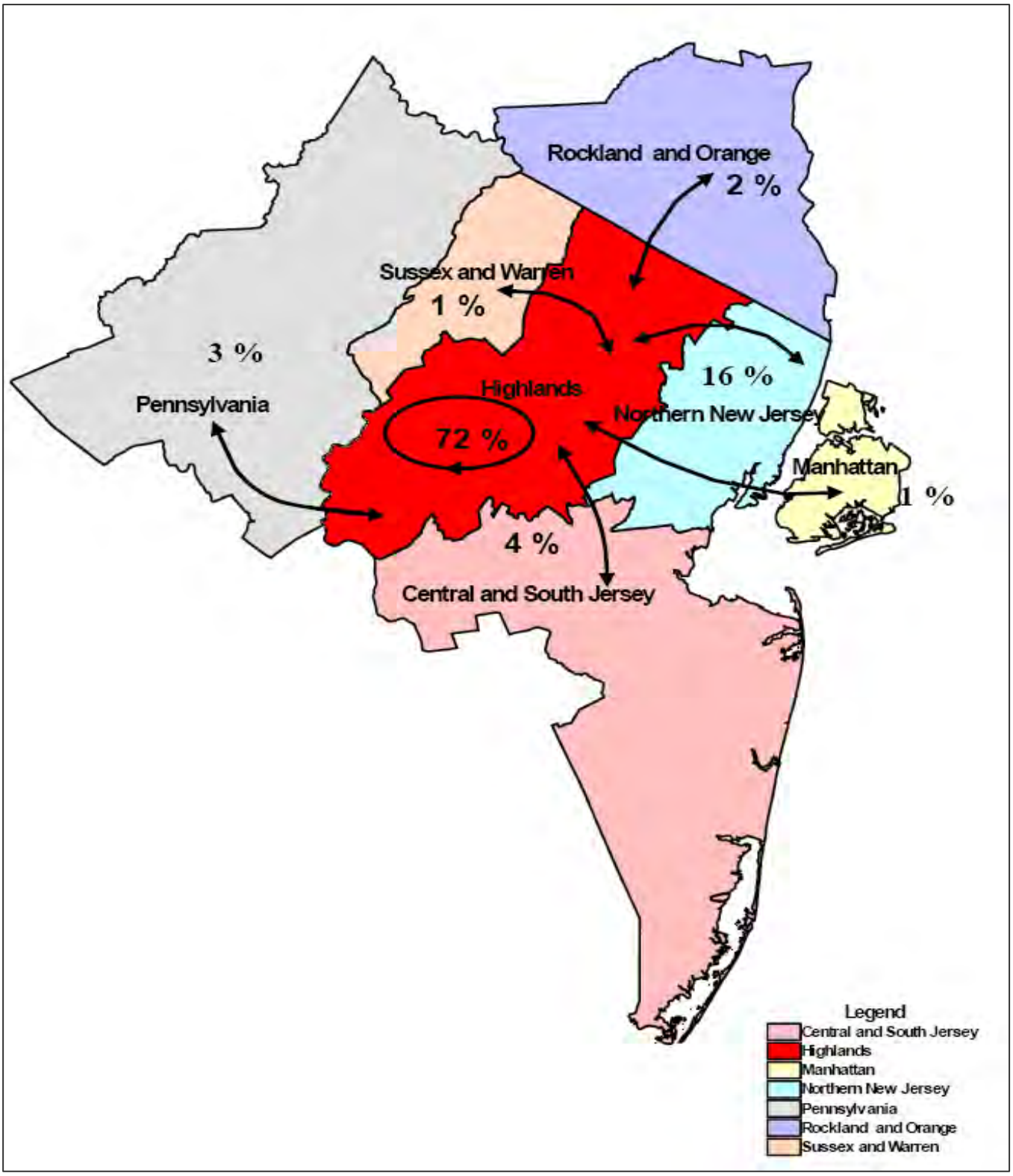
Note: table prepared for New Jersey Highlands Council

Table 3 - Highlands Model-2002 Total Daily Vehicle Trips

District		Highlands	Pennsylvania	Sussex and Warren	Northern NJ	Central and South NJ	Manhattan and East	Rockland and Orange	Total
		1	2	3	4	5	6	7	**Total**
Highlands	1	1,328,616	59,130	21,802	300,263	82,060	13,308	27,582	**1,832,762**
Pennsylvania	2	60,657	4	5,672	19,008	58,479	6,989	1,473	**152,284**
Sussex and Warren	3	24,725	5,910	113,967	7,374	1,606	593	2,807	**156,985**
Northern NJ	4	278,847	17,734	5,231	5,326,325	288,945	173,787	115,400	**6,206,273**
Central and South NJ	5	78,797	58,286	1,301	310,913	5,026,066	31,041	7,135	**5,513,544**
Manhattan and East	6	13,056	7,264	583	173,195	32,038	0	10,165	**236,307**
Rockland and Orange	7	27,407	1,479	2,715	116,869	7,078	9,819	0	**165,374**
Total		**1,812,105**	**149,807**	**151,271**	**6,253,947**	**5,496,272**	**235,537**	**164,562**	**14,263,529**

Note: Table prepared for New Jersey Highlands Council

Figure 4 – Vehicle Trip Distribution Summary to/from Highlands



Note: Figure prepared for New Jersey Highlands Council

NETWORK PERFORMANCE SUMMARY

The results of the assessment were analyzed to develop a summary of various network performance measures for the base year 2002. All of the results are representative as an estimation of higher-level roadways only and not the roadway network at large. Vehicle miles traveled (VMT), vehicle hours traveled (VHT), average speed, average trip and traffic congestion are all included in the assessment. Final, color-coded maps were developed based on volume capacity ratios for AM and PM peak periods. The AM peak period is the 2-hour period between 6:30 and 8:30 AM, while the PM peak period is the 2.5 hours between 3:30 and 6:00 PM. The following sections provide a summary of each of the performance measures.

Vehicle Miles Traveled (VMT)

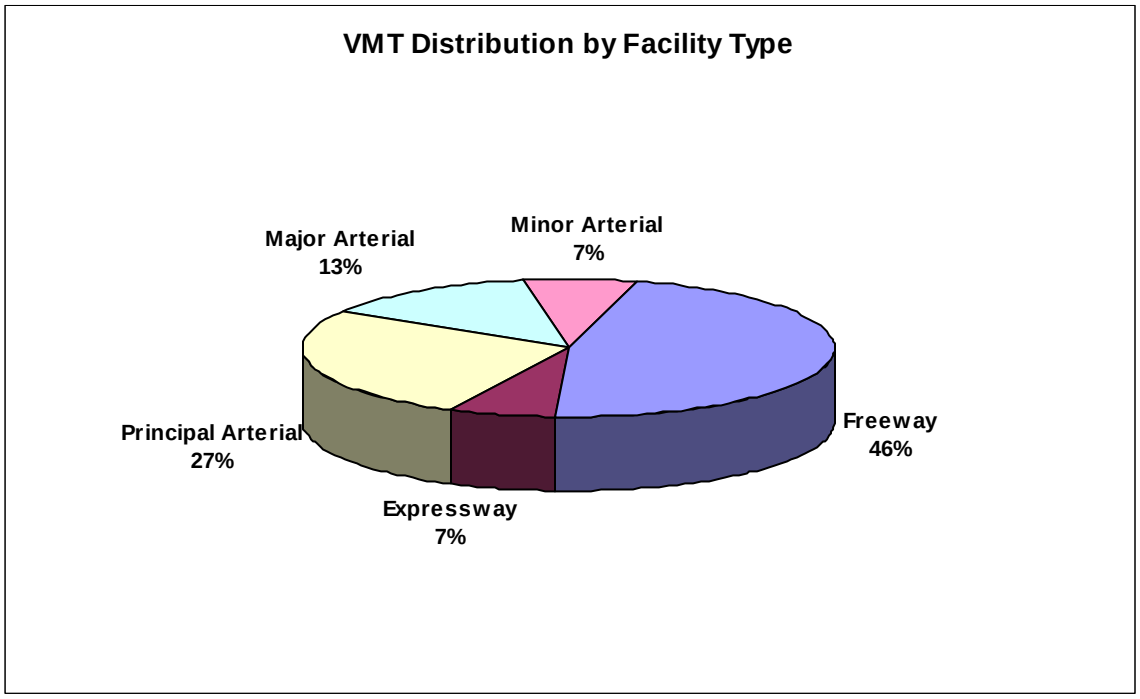
The vehicle-miles traveled were summarized on a time period basis and grouped by facility type into the following categories: freeway, expressway, principal arterial, major arterial and minor arterial. As listed in Table 4, the VMT for the Region's higher-level roadways is 19.77 million miles on an average weekday. The AM and PM peak periods together contribute approximately 40 percent of the daily VMT although the peak periods constitute only 4 1/2 hrs of the 24 hrs. The VMT breakdown based on facility type indicate that freeways contribute about 47 percent of the higher-level roadway VMT although freeways represent only 11 percent of total center lane miles. Center lane miles are calculated by totaling roadway distance irrespective of the number of lanes in a roadway type. High VMT on freeways is attributed to the fact that freeways are generally characterized by more travel lanes and higher average speed limits. Expressways contribute 7 % of VMT while accounting for only 2% of all center lane miles included in the model. Expressways, like freeways are generally characterized by higher average speeds and multiple travel lanes. All arterials combined contribute about 47 percent of VMT calculated in the model, although arterials represent 87 percent of the total center lane miles in the Highlands Region. Because arterials generally can not carry the same volume of vehicles as freeways and expressways, they have disproportionately low VMT. Figure 5 represents the VMT distribution by facility type.

Table 4 - VMT Distribution by Facility Type and Time Period

Facility Type	AM	PM	Off-Peak	Daily	Daily Proportion
Freeway	1,633,624	1,912,005	5,671,078	9,216,707	47%
Expressway	243,791	258,564	796,082	1,298,437	7%
Principal Arterial	932,346	1,118,323	3,206,525	5,257,194	27%
Major Arterial	475,896	547,571	1,596,507	2,619,974	13%
Minor Arterial	293,880	305,753	781,992	1,381,625	7%
Total	**3,579,537**	**4,142,216**	**12,052,184**	**19,773,937**	**100%**
Proportion	**18%**	**21%**	**61%**	**100%**	

Note: Table prepared for New Jersey Highlands Council

Figure 5 - VMT Distribution on Daily Basis by Facility Type



Note: Figure prepared for New Jersey Highlands Council

Vehicle Hours Traveled (VHT)

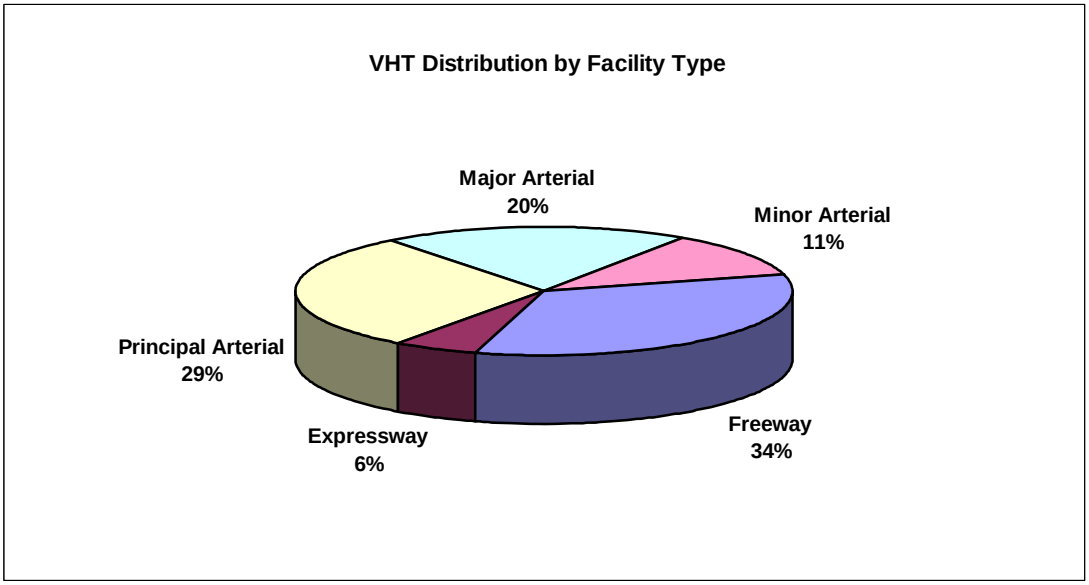
As listed in Table 5, the total VHT for the Region's higher-level roadways was 504,420 hours on a daily basis for an average weekday. AM and PM peak periods together contribute about 44 percent of the total VHT in the Highlands Region. The breakdown based on facility type indicate that freeways contribute about one-third (33.5%) of the total VHT. All arterials combined contribute about 61 percent of the total VHT of which principal arterials generate about 30 percent. Figure 6 represents the VHT distribution by facility type on a daily basis.

Table 5- VHT Distribution by Facility Type and Time Period

Facility Type	AM	PM	Off-Peak	Daily	Daily Proportion
Freeway	33,265	38,854	96,864	168,983	34%
Expressway	6,051	6,417	15,946	28,414	6%
Principal Arterial	31,045	37,088	80,570	148,703	29%
Major Arterial	19,601	22,577	59,184	101,362	20%
Minor Arterial	12,740	13,257	30,961	56,958	11%
Total	**102,702**	**118,193**	**283,525**	**504,420**	**100%**
Proportion	**20%**	**23%**	**56%**	**100%**	

Note: Table prepared for New Jersey Highlands Council

Figure 6 - VHT Distribution by Facility Type



Note: Figure prepared for New Jersey Highlands Council

Average Speed

Average speed is calculated by dividing the total vehicle miles traveled by the total vehicle hours traveled for each facility type. Table 6 summarizes the average speeds by facility type and time period. The average speeds for AM and PM peak periods are almost the same indicating similar congestion on roadways in both time periods. The off-peak speeds are higher than the peak speeds for all facility types, which indicate lower levels of congestion. The off-peak speeds for freeways, expressways, and principal arterials are about 10 mph higher than the peak speeds. The overall average speed for the higher-level roadways in the Highlands Region is about 39 mph.

Table 6- Average Speed by Facility Type and Time Period

Facility Type	AM	PM	OP	Daily
Freeway	49.1	49.2	58.5	54.5
Expressway	40.3	40.3	49.9	45.7
Principal Arterial	30.0	30.2	39.8	35.4
Major Arterial	24.3	24.3	27.0	25.8
Minor Arterial	23.1	23.1	25.3	24.3
Total	**34.9**	**35.0**	**42.5**	**39.2**

Note: Table prepared for New Jersey Highlands Council

Daily VMT, VHT, and Average Speed by County

VMT, VHT, and average speed were calculated for the Region's higher-level roadways and summarized by county in the Highlands Region as shown in Table 7. Table 8 lists the center-lane miles by county in the Highlands Region. Morris County has the highest VMT at roughly 10 million miles and VHT at roughly 261,000 hours, which is more than 50 percent of the total VMT and VHT generated in the Highlands Region. Morris County represents about 36 percent of total roadway miles. Somerset County has the highest average speed at 44.72 mph. Passaic County has the lowest average speed at 33.25 mph, and constitutes about 8 percent of the total roadway miles. The lower average speed could be attributed to the fact that only a portion of Passaic County is located in the Highlands Region and those roadways consist mainly of minor arterials.

Table 7- VMT, VHT, and Average Speed by County on Average Weekday

County	VMT	VHT	Average Speed
Bergen	1,041,754	26,511	39.30
Hunterdon	2,109,725	48,799	43.23
Morris	10,154,815	261,128	38.89
Passaic	1,114,787	33,523	33.25
Somerset	1,888,473	42,226	44.72
Sussex	1,403,961	40,478	34.68
Warren	2,060,422	51,755	39.81
Total	19,773,937	504,420	39.20

Note: Table prepared for New Jersey Highlands Council

Table 8- Roadway Miles in Highlands Region by County

County	Roadway Miles	Proportion
Bergen	48	4.0%
Hunterdon	167	14.1%
Morris	430	36.3%
Passaic	99	8.3%
Somerset	82	6.9%
Sussex	138	11.6%
Warren	222	18.7%
Total	**1186**	**100%**

Note: Table prepared for New Jersey Highlands Council

Average Trip Length

The average trip length was estimated for each trip purpose using the trip tables on a daily basis. These calculations were performed for each county included in the Highlands Region and the results are shown in Tables 9 and 10. Table 9 shows the average trip length by distance in miles and Table 10 represents the average trip length by time in minutes. The average trip length estimated for home-based work (HBW) is greater than other purposes throughout the region. Trips that are home-based, originate at home so that a home-based work (HBW) trip would begin at home and end at work. Warren County has the highest average trip length, measured in miles, for home-based work followed closely by Hunterdon and Sussex Counties. Sussex County has the highest average trip length, measured in minutes, for home-based shopping (HBSH) and home-based other (HBO) purposes. Hunterdon County has the highest average trip length, measured in minutes, for non-home based (NHB) purposes. Bergen County has the lowest trip lengths for all purposes. This could be attributed to the fact that only a small portion of the entire Bergen County is part of the Highlands Region and hence included in the Highlands Model.

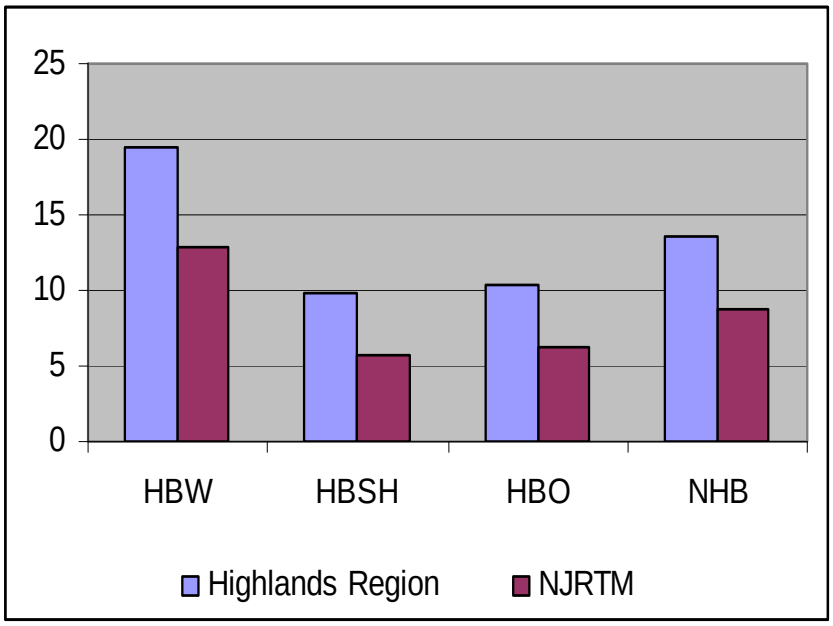
Figures 7 and 8 show the respective comparison between average trip lengths in the Highlands Region and the NJRTM region as a whole, both in miles and minutes. When the Highlands Region was compared to the NJRTM region, average trip lengths in terms of miles were found to be 50 - 70% longer in the Highlands Region. When measured in terms of minutes, the average trip length was found to be 35 - 45% longer in the Highlands Region as well. The difference can be attributed to the sprawling, low density land use patterns characterizing much of the Region. The average trip length for the Highlands Model is significantly greater than the NJRTM Model for all four purposes. This may be attributed to the sprawling, low-density land use patterns characterizing much of the Highlands Region.

Table 9 - Average Trip Length – Distance in Miles

County	Purpose			
	HBW	HBSH	HBO	NHB
Bergen	16.03	7.89	9.12	11.42
Hunterdon	22.73	12.42	12.38	18.52
Morris	18.28	8.16	9.59	12.65
Passaic	19.69	13.96	12.32	15.51
Somerset	19.95	10.18	11.61	16.37
Sussex	22.44	14.58	13.24	16.39
Warren	22.83	9.69	10.15	16.32
Highlands Region	19.38	9.74	10.41	13.54
NJRTM	12.88	5.73	6.22	8.82

Note: Table prepared for New Jersey Highlands Council

Figure 7 - Average Trip Length Comparison Highlands Region to NJRTM - Distance in Miles



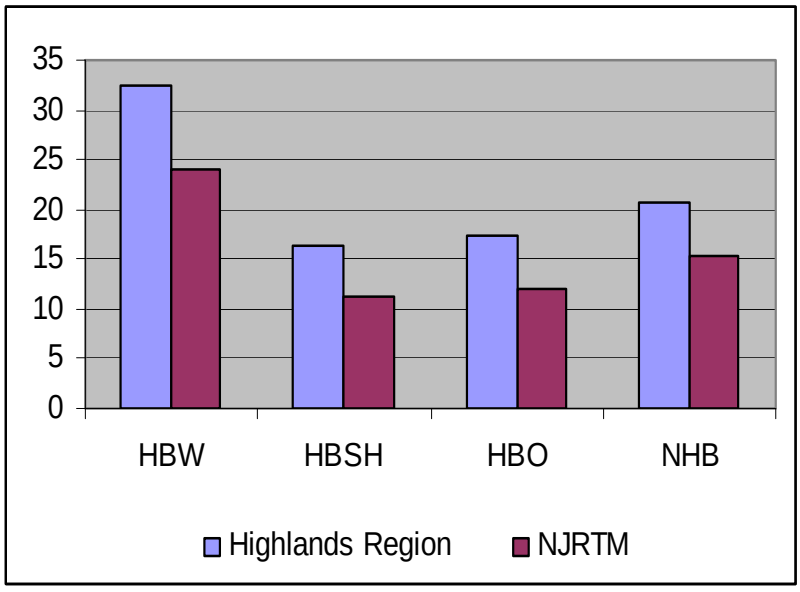
Note: Table prepared by New Jersey Highlands Council

Table 10 - Average Trip Length -Time in Minutes

County	Purpose			
	HBW	HBSH	HBO	NHB
Bergen	27.38	14.03	15.85	18.31
Hunterdon	35.64	20.40	20.24	27.26
Morris	30.54	14.13	15.99	19.30
Passaic	36.74	23.34	21.44	25.06
Somerset	31.90	16.68	19.10	24.75
Sussex	40.34	23.47	21.44	25.26
Warren	35.84	16.66	17.08	24.70
Highlands Region	32.41	16.47	17.35	20.71
NJRTM	23.97	11.30	11.94	15.21

Note: Table prepared for New Jersey Highlands Council

Figure 8 - Average Trip Length Comparison Highlands Region to NJRTM - Distance in Minutes

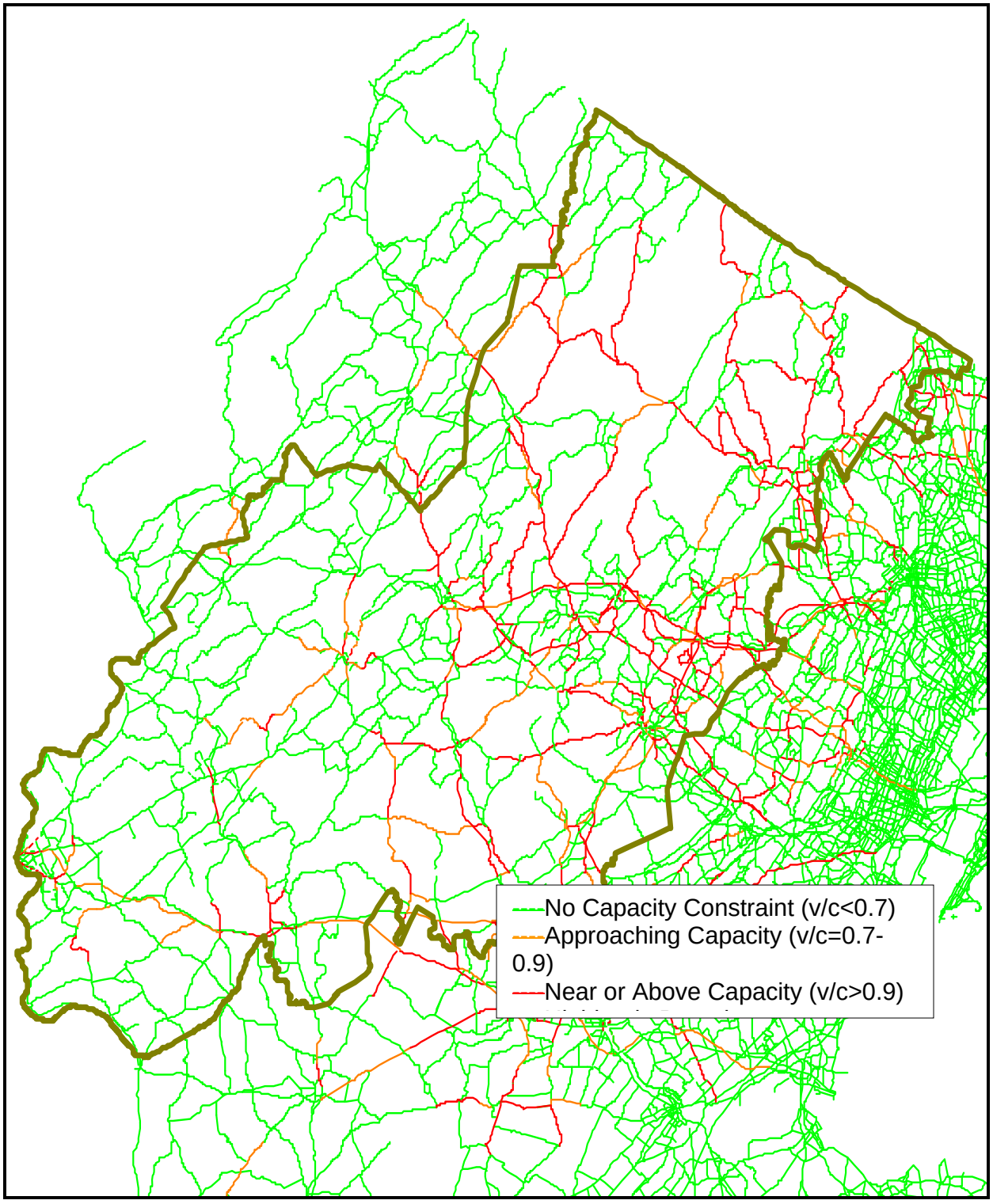


Note: Table prepared by New Jersey Highlands Council

Traffic Congestion

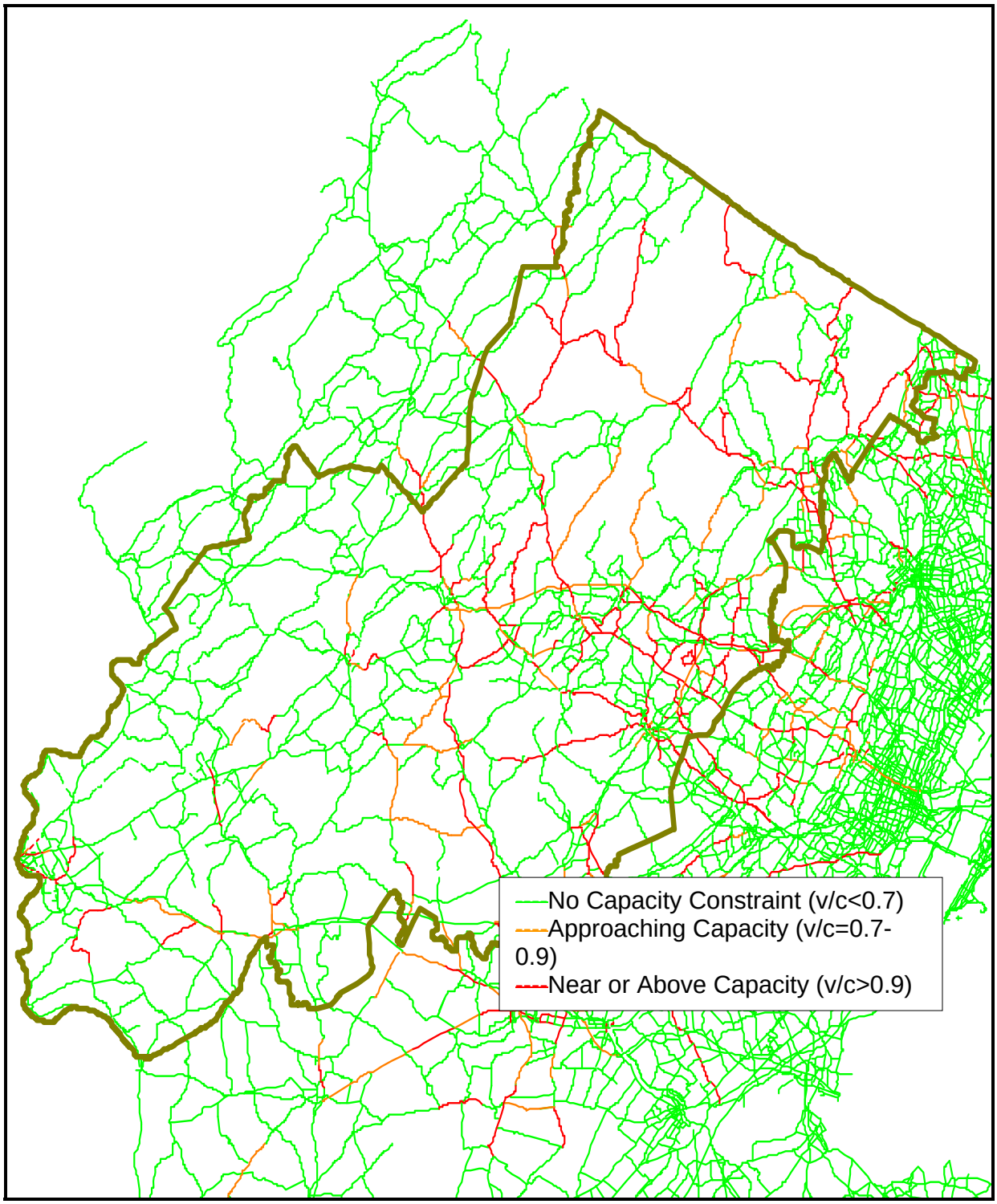
Traffic flow was estimated for all roadway segments included in the network. Volume/capacity (v/c) ratios were calculated to identify the existing congestion levels during the AM and PM peak periods. Figures 9 and 10 depict the AM and PM peak period v/c ratios in three colors for the base year 2002. The green color represents v/c ratio less than 0.7, generally indicating free flow traffic conditions. The links in yellow represent links with v/c ratio between 0.7 and 0.9 indicating traffic volumes are approaching roadway capacities while red represent links with v/c over 0.9 indicating traffic volume near or above available link capacities. The links in red are expected to have recurring congestion. In the base year, the Highlands sub-area model indicates that Interstate highways 78, 287 and 80 all experienced heavy traffic flow that was at or above capacity during the AM and PM peak periods. Many U.S. and State Highways throughout the Region also experienced traffic flow which was at or above capacity. Some of the major U.S. and State Highways include Routes 10, 24, 206, 202, 46, 31, 23, 15, 202, 181 and 117.

Figure 9 - Volume/Capacity Ratios for 2002- AM Peak Hour



Note: Figure prepared for New Jersey Highlands Council

Figure 10 - Volume/Capacity Ratios for 2002 - PM Peak Hour



Note: Figure prepared for New Jersey Highlands Council

AIR QUALITY CONFORMITY

Air pollution is generally comprised of both stationary and mobile sources. Because mobile source pollution is generated by vehicle emissions, the Roadway Capacity Assessment calculated the affects of VMT on overall air quality. The emissions inventories were developed following the industry standard program Mobile 6.2. Mobile 6.2 provides emission estimates for the following pollutants: Ozone (Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOX)), Carbon Monoxide (CO) and Particulate Matter (PM) 2.5. The number, 2.5, defines the maximum size of the particulate matter being recorded, which must be less than or equal to 2.5 micrometers.

PM 2.5 is calculated only for those counties in nonattainment of this pollutant. The Clean Air Act and Amendments of 1990 define "nonattainment areas" as a location where air pollution levels persistently exceed National Ambient Air Quality Standards.

The majority of input data for this project was provided by NJDOT and NJDEP, such as:

- Temperature and Humidity Data
- Vehicle Type Mix
- Inspection and Maintenance Program
- Vehicle Registration Distribution
- Diesel Fraction

The emissions factors were defined as emissions per vehicle per mile (in kilograms or tons). To obtain the emission estimates for each pollutant, the emission factors were multiplied by vehicle miles traveled (VMT). The emission estimates are usually expressed in tons/day or tons/year. The ozone emissions were developed for the conditions of highest ozone that typically occur during the warmest summer days of the year, while the CO emissions were developed for the conditions of highest CO that typically occur during the winter. The PM2.5 emissions were developed using a two-season approach, consistent with the 2002 Baseline Interim PM2.5 Emissions Project. This approach determined the PM2.5 emission factors for one "average" summer day and one "average" winter day. Since the emissions estimates for PM2.5 are generally expressed in annual terms, the average summer emissions factor was weighted by 183 days and winter by 182 days.

The summary of annual emissions is presented in Table 11 for the base year 2002. It is estimated that the vehicles traveling within the Highlands Region will emit on an annual basis: 178,000 tons of CO, 8,000 tons of VOC, 18,900 tons of NOX and 210 tons of PM2.5. Appendix B includes lookup tables for the seven counties within the Highlands Region. These tables were developed for speeds ranging from 2.5 mph to 65 mph evaluated at an increment of 2.5 mph. The pollutant emission levels, measured in terms of grams per vehicle mile, were examined at various speeds. Several trends were observed. For CO and NOX, it was found that pollution intensity diminished at increasing speed increments until reaching 35 mph, thereafter the amount of pollution emitted increased until reaching the highest evaluated speed of 65 mph. PM2.5 followed a similar trend, however, once 35 mph was reached, the amount of measured pollution remained constant. VOC emissions were highest at 2.5 mph and lowest at 65 mph. The air conformity analysis will serve as a baseline for comparison with future Highlands build out and transportation modeling scenarios in subsequent phases of Regional Master Plan development.

Table 11: Summary of Annual Emission Estimates (tons) for 2002

NJ County		CO	VOC	NOX	PM2.5
Name	In/Out of Highlands				
Bergen	Outside Highlands	120,440	6,047	13,110	237.2
Bergen	Inside Highlands	9,636	433	1,088	18.4
Hunterdon	Outside Highlands	15,519	703	1,450	NA
Hunterdon	Inside Highlands	19,268	801	2,898	NA
Morris	Outside Highlands	8,814	429	767	13.4
Morris	Inside Highlands	93,223	4,182	8,465	140.5
Passaic	Outside Highlands	48,155	2,378	5,643	102.7
Passaic	Inside Highlands	10,278	497	1,105	19.6
Somerset	Outside Highlands	43,812	2,234	4,803	90.0
Somerset	Inside Highlands	15,477	668	1,896	31.1
Sussex	Outside Highlands	7,777	383	701	NA
Sussex	Inside Highlands	12,711	628	1,212	NA
Warren	Outside Highlands	4,666	176	894	NA
Warren	Inside Highlands	17,047	735	2,227	NA
Total Inside Highlands Region		**177,639**	**7,944**	**18,891**	**209.6**

LINKING TRANSPORTATION AND LAND USE

The conditions of higher-level roadways and affects on air quality were described in the Roadway Capacity Assessment. Some of the findings point to longer average trips measured in both distance and time and more traffic congestion when compared to the North Jersey Region as a whole. Federal and state investments in the interstate highway system, inefficient land use patterns and a lack of comprehensive regional planning have placed and continue to place significant stresses on the region's infrastructure and natural resources. This section discusses the critical relationship between transportation and land use in the Highlands Region, and the necessity to incorporate smart growth principles in transportation improvements in order to protect the environment while encouraging economic growth. Many of the transportation improvements made in recent decades have been in the form of adding roadway capacity, with the intent of relieving or mitigating traffic congestion. It is widely acknowledged, however, that the strategy of adding roadway capacity is not a sustainable solution to the many problems facing the transportation system[19]. Through smart growth principles, however, and by looking at transportation and land use planning comprehensively, a long-term strategy can be developed to better solve the region's transportation issues.

[19] Victoria Transport Policy Institute, *Why Manage Transportation Demand?;* http://www.vtpi.org/tdm/tdm51.htm

LAND USE CHARACTERISTICS

n order to develop a more accurate representation of recent land use changes in the Highlands Region, Land Use/Land Cover (LULC) data for years 1986, 1995 and 2002 were compiled. Table 12 shows the changes in land use as observed between 1986 and 2002. It indicates an approximate 10% increase in Urban land from 197,949 to 218,202 acres (a change of about 20,253 acres) between 1995 and 2002. The increase in Urban land is mirrored by a respective decrease in Agriculture and Forest between 1995 and 2002. Between 1986 and 2002, Agriculture decreased 27,560 acres or roughly 19% and Forest land decreased by 15,378 acres or 3%. Both Water and Barren/Transitional lands decreased slightly, while Wetlands increased slightly. In order to gain a better understanding of the recent changes in land use/ land cover data in the Region, it is important to examine the key role of zoning on land use.

Table 12 - Land Use Land Cover Change between 1986 and 2002

Land Use/Land Cover Classification and Series	Total Acres			Change 1986-1995	% Change 1986-1995	Change 1995-2002	% Change 1995-2002
	1986	1995	2002				
Urban (1000)	176,135	197,949	218,202	21,814	12%	20,254	10%
Agriculture (2000)	145,743	128,639	118,184	-17,104	-12%	-10,455	-8%
Forest (4000)	417,621	412,004	402,244	-5,617	-1%	-9,761	-2%
Water (5000)	30,433	32,592	32,406	2,159	7%	-186	-1%
Wetlands (6000)	81,808	78,379	78,866	-3,429	-4%	488	1%
Barren/Transitional (7000)	7,252	9,460	9,120	2,208	30%	-340	-4%

ZONING CHARACTERISTICS

The Highlands Council, working with its constituent municipalities, consultants, and other State and local resources, compiled zoning information in order to understand local conditions and potential for future land development. This zoning information was consolidated into 16 composite zone categories for ease of comparison and evaluation regionally. Current (as of November 2005) zoning data from all 88 municipalities in the Highlands Region was collected, including the designated use (residential, commercial, institutional, etc). More information can be found on land use and zoning characteristics in the Highlands Region in technical report entitled Regional Land Use Conditions and Smart Design Technical Report.

Highlands Composite Zones

Estate Residential	Garden Apartments
Resource Residential	Age Restricted Housing
Rural Residential	Mixed Use/Age Restricted Housing
Low Density Residential	Mixed Use
Suburban Residential	Office/Commercial
Medium Density Residential	Retail
High Density Residential	Industrial
Townhouse/Attached Residential	Institutional/Public Lands

Some of the Highlands Composite Zones have been assigned density ranges. Estate Residential, Resource Residential, Rural Residential, and Low Density Residential are all lower density residential zones which range from less than 0.09 to 1.00 dwelling units/acre. Suburban Residential, Medium

Density Residential, and High Density Residential range from 1.01 to 8.00 dwelling units/acre. Townhouse/Attached Residential and Garden Apartments have the highest densities and are above 8.00 dwelling units/acre. Lands that are zoned for Institutional or Public Lands were grouped for this category. The remaining composite zones are more diverse and therefore without specified density ranges.

Table 13 shows the composite zone breakdown for each county in the Region, Planning Area, Preservation area, and the entire Highlands Region. For the Highlands Region, the Rural Residential zones represent the largest composite zone component in the Highlands Region, accounting for 342,483 acres, or 42% of all zoned lands. Institutional/Public Lands zones are identified as open space, parks, or institutional lands and represent 87,559 acres or 11% of all zoned land in the Highlands Region. Retail/Office/Commercial accounts for 5% or 39,031 acres of zoned lands in the Region. Industrially zoned lands account for 4% of the Region or 32,999 acres. Estate/Resource Residential represents 14%, Suburban/Low Density Residential represent 14%, Medium Density Residential represents 4%, and Highest Density Residential represents 5% of zoned land. Mixed Use/Age Restricted Housing represents 1% or about 7,283 acres, while Age Restricted represents 0%.

The seven Highlands counties differed with respect to composite zone breakdown. Bergen County indicates a more proportionate breakdown which includes a smaller percentage of Rural Residential, and a greater percentage of Institutional/Open Space as well as medium and higher density zones. Hunterdon, Passaic, and Warren Counties each have greater proportions of land categorized as Rural Residential. Somerset County has a significant portion zoned as Estate/Resource Residential. Bergen, Morris and Sussex Counties all show a significant percentage of land zoned as Institutional/Open Space.

The table also indicates the zoning characteristics of the Planning and Preservation Areas. Municipalities in the Planning Area have a greater percentage of Retail/Office/Commercial, Industrial, and Mixed Use/Age Restricted zoned lands than the Preservation Area. The Preservation Area towns, Estate/Resource Residential, Rural Residential, and Suburban/Low Density Residential account for 75% of the zoned land.

Table 13 - Zoning Characteristics Analysis

	Institutional / Public Lands	Retail/Office /Commercial	Industrial	Mixed Use Age-Restricted	Age Restricted	Highest Density Res.	Med. Density Res.	Suburban/Low Den. Res.	Rural Res.	Estate/ Resource Res.
Bergen County	33%	4%	4%	0%	0%	20%	8%	22%	7%	0%
Hunterdon County	4%	5%	1%	0%	0%	1%	1%	4%	43%	41%
Morris County	11%	5%	4%	1%	1%	7%	6%	25%	33%	7%
Passaic County	7%	2%	2%	1%	1%	2%	6%	12%	53%	14%
Somerset County	9%	3%	1%	1%	0%	2%	1%	19%	15%	48%
Sussex County	27%	7%	4%	2%	0%	7%	5%	9%	36%	2%
Warren County	3%	4%	8%	1%	0%	2%	2%	8%	67%	5%
Planning Area	**7%**	**7%**	**6%**	**2%**	**0%**	**6%**	**6%**	**15%**	**38%**	**13%**
Preservation Area	**15%**	**2%**	**2%**	**0%**	**1%**	**3%**	**2%**	**13%**	**47%**	**15%**
Highlands Region	**11%**	**5%**	**4%**	**1%**	**0%**	**5%**	**4%**	**14%**	**42%**	**14%**

INTEGRATING EFFICIENT LAND USE POLICY AND TRANSPORTATION PLANNING

Efficient land use planning is characterized by compact, mixed use development and redevelopment usually located in centers or designated growth areas. Instead of extending infrastructure into outlying areas, development is encouraged near existing infrastructure and transportation hubs. This encourages a denser, more compact built environment that is accessible by mass transportation; one which promotes walkability and connectivity.

Jobs, Housing and Mixed Uses

As land-use patterns continue to separate homes, jobs and other destinations, longer vehicle trips and increased congestion continue to be a concern. The idea of mixing uses whereby combining jobs, housing, retail and other uses in a compact, efficient manner is one approach which can lead to shorter and less frequent trips taken and less vehicle miles traveled. These mixed uses, when integrated as a compact, walkable community, can also create and enhance a sense of place and vitality, which may in turn lead to higher property values and lower infrastructure costs[20]. Creating a more compact built environment also reduces land consumption, thus protecting open space and reducing impervious surfaces, ultimately improving watersheds and water quality. Following smart growth principles and efficient land use policy characterized by compact, mixed use development, higher densities and a more compact built environment, the Highlands Region can begin to promote alternatives to automobile travel. The Highlands Council can better achieve the goals outlined in the Highlands Act by creating more transportation choices, including mass transit, bicycle, and pedestrian travel.

Connecting Circulation Plan and Land Use Plan Elements

While municipal master plans must include a land use plan element, Municipal Land Use Law does not require that a circulation plan element be included. There is no requirement that circulation plan and land use plan elements show a relationship, which would ensure that transportation improvements are supported by and supportive of land use goals. One possible solution being proposed by NJDOT is the development of a Mobility and Community Form Element which would serve as a hybrid element, working to improve mobility while supporting efficient land use. Form-based development codes, unlike use-based Euclidian zoning, contain massing and design criteria based on the function of the surrounding environment. Form based codes allow more design flexibility than traditional zoning. Where conventional zoning is almost entirely about arraying uses into districts, form-based zoning cares little about the actual uses, as long as they can be made to be compatible with surrounding uses. The management tools in conventional zoning are also different whereby conventional zoning relies heavily on special permits and a contentious hearing process, developments under form-based zoning prove their adherence to forms and performance measures through the administrative permitting process.

Transit Oriented Development

Transit Oriented Development (TOD) is a method that integrates transportation planning specifically by promoting more compact development around existing transportation infrastructure as an alternative to sprawl. TOD focuses mixed-use development around transit stations, and is designed to create walkable communities with access to multiple modes of transportation. TOD can provide for a variety of transportation options while reducing dependency on the automobile. NJDOT is the oversight for

[20] Smart Growth Online, Principles of Smart Growth: Mix Land Uses.
http://www.smartgrowth.org/about/principles/principles.asp?prin=1andres=1152

TOD in the Highlands Region and the rest of the state through its Transit Village Initiative. The Transit Village Initiative promotes redevelopment in traditionally vibrant and historic centers. Municipalities committed to redeveloping the area around their transit facilities can be designated Transit Villages, prioritizing them for state redevelopment grants as well as other benefits associated with the program. Currently there are two towns in the Highlands Region that have been designated through the Transit Village Program: Netcong Borough and Morristown Town (both located in Highlands Planning Area). Transit Friendly Communities for New Jersey is a program developed to help revitalize downtowns, encourage local economic development and reduce reliance on the automobile. The program is a partnership between NJ Transit, NJDCA, Office of State Planning and non-profit groups[21]. Eleven stations were initially selected representing communities of various sizes and from a diverse set of backgrounds, but all of which showed some degree of development opportunity. Technical assistance was then provided for a range of issues: traffic calming; smart growth development and zoning strategies, revitalization and bicycle and pedestrian plans. The mission of the program is to achieve quick results in the selected communities, and simultaneously increase public interest and awareness around transit friendly land use strategies.

NJ Transit Score Program

The Transit Score was originally developed in 2001 by NJ TRANSIT as part of its report, NJ TRANSIT's Call to Action: An Investment for the future. Included in the report was a map, "2020 TRANSIT Possibilities for the Future", which came to be known as the "2020 Transit Map."

In 2004, NJ Transit was asked by the Office of Smart Growth (OSG) to relate transit score to actual existing transit market shares, as well as to existing services. NJ Transit worked with the Delaware Valley Regional Planning Commission (DVRPC) , the Metropolitan Planning Organization that covers four counties in southern New Jersey to update the Transit Score. This update also looked at the relationship between the Transit Score, existing share of work trips that use transit, and transit service characteristics. The Transit Score will be used by NJ TRANSIT and the OSG to assist municipalities and other state agencies to assist in planning for future land use patterns that support transit in the future to accommodate growth.

The Transit Score is a numerical index, which is based on a regression equation that includes three factors that influence the potential for transit ridership. A Transit Score is estimated for each of the 2,,050 Census Tracts in New Jersey. This provides a common statewide unit of geography to estimate and compare the Transit Score. The Transit Scores are based on year 2000 data, and can also be estimated for future forecasts for each of the three factors. The three factors that are examined and comprise the Transit Score are:

1. Population Density
2. Employment Density
3. Zero Car Household Density

All transit scores are classified into one of five categories. These five categories represent ranges based on observed land use characteristics and actual transit service patterns. Due to the Highlands Region being influenced by the larger 13 county Metropolitan Planning Area and travel through the Region between New York and Pennsylvania, the transit score analysis at a statewide level may require further evaluation for the 88 municipalities at a sub-regional scale.

[21] Project for Public Spaces, Transit Friendly Communities for New Jersey; http://www.pps.org/info/projects/nj_transit_friendly_communities

Connecting Brownfields, Grayfields and Transportation

Brownfields are lands previously used for industrial purposes, or certain commercial uses, and which may be contaminated by low concentrations of hazardous waste or pollution[22]. Grayfields are usually characterized by older, economically obsolete retail and commercial areas which may include outdated buildings in disrepair, large parking lots, and which fail to generate the revenue that would justify their continued use[23]. Once these sites are cleaned, a host of economic and environmental benefits can be realized. There are also benefits to the transportation system which can result from brownfield and grayfield redevelopment. Brownfields and grayfields are usually located central to the most people, businesses and existing infrastructure. Redevelopment that is central to people and businesses reduces traffic from new jobs and housing by increasing the number of transit and pedestrian trips which place less demand on roads. Central location also results in automobile trips that are shorter on average than would be in conventional-type development.

Transportation and Farming

One of the major problems facing farmers in New Jersey is the ability to move large pieces of farm equipment on public roadways in order to access different farms and markets safely and efficiently. There are more than 4,000 farms in the Highlands Region, and a host of community and roadside farmers' markets. In order to ensure the safety and viability of farming as an occupation in the Highlands Region, safe travel routes for farmers need to be coordinated with local governments and state agencies such as NJDOT, New Jersey Department of Agriculture and New Jersey Farm Bureau. New transportation improvements to roads and bridges should be examined for the ability to accommodate farmers and farming equipment especially in rural areas. Alternative routes should also be explored where feasible, whereby developing inter-parcel access roads for farmers without increasing impervious surfaces. In order to better serve farmers in the Highlands Region, "Farm-to-Market" routes should be established to improve upon the movement of goods from farms and areas of supply to areas where goods are demanded such as downtowns or urban markets, and in support of agri-tourism programs.

Agriculture in Burlington County's Route 206 Farm Belt: Strategies for Farm Viability

In August of 2000, the Burlington County Board of Chosen Freeholders received a Smart Growth Planning Grant from the New Jersey Department of Community Affairs to promote smart growth and the viability of agriculture in a thirteen-municipality region traversed by U.S. Route 206 in the northeastern part of Burlington County. This "farm belt" accounts for nearly half of the County's farmland base. A study entitled Agriculture in Burlington County's Route 206 Farm Belt: Strategies for Farm Viability provides information to aid the Burlington County Board of Chosen Freeholders through four main objectives24:

- identifying a balance between smart growth, farmland preservation, and viable agriculture in the region;
- developing a sound understanding of the agricultural industry today and the infrastructure, resources, and land use patterns needed for the industry to survive;

[22] United States Department of Environmental Protection, Brownfields Cleanup and Redevelopment - Brownfields Definition; http://www.epa.gov/brownfields/glossary.htm
[23] Federal Reserve Bank of Richmond, Community Affairs - Greyfields; http://www.richmondfed.org/community_affairs/topical_essays_and_resources/reports/greyfields.cfm
[24] Agriculture in Burlington County's Route 206 Farm Belt: Strategies for Farm Viability (2004), Heinrich-Schilling Joint Venture.

- identifying constraints and opportunities for agriculture in the region to exist alongside development; and,
- developing a vision of agriculture in the Route 206 Farm Belt for the future.

Transportation and Growth Inducing Effects

The Highlands region is experiencing significant development pressure, a high level of congestion on some of its highways, and environmental concerns about preserving its natural resources. The diversity of land uses within the region, a dispersed activity location pattern, close proximity to urban centers like New York, automobile dependence of the region's residents and workers, economic prosperity of the entire region covering New Jersey, New York and Pennsylvania, have all contributed to this pressure. With the prevailing land use and transportation issues in the Highlands region, decisions on transportation investments within the region need to consider potential induced travel demand and induced land use changes that may result from transportation projects within and outside the region and recognize the potential for both near term and long term effects.

Because the Highlands region may be affected by transportation projects and growth trends both inside and outside its boundaries. For example, a major transit project like the Trans-Hudson Express Tunnel (the THE Tunnel), or any significant highway or bridge capacity expansion project on the I-80 or I-78 corridor may have significant impacts on the Highlands even if those projects are outside the region. Because of the interaction of the region with surrounding regions, it would be appropriate to integrate the impacts of all significant external projects and growth trends in the planning process when evaluating the impact of transportation projects within the Highlands region because such projects and trends have the potential to substantially increase travel demand within the region.

The following is a summary of the literature review findings regarding growth inducing effects as related to highway and transit projects:

- The literature review suggests that the Council's concerns about induced travel demand, induced demand for additional land development, and potential changes in land use, are valid when the concerns are about highway projects.
- Given the fact that significant portions of the Highlands Region are environmentally sensitive, policy makers and planners should exercise caution when making transportation investment decisions, especially when the decisions are about adding significant new highway capacity.
- Impacts of rail transit are highly localized and they mainly occur in downtown areas and depend on zoning, parking, and traffic policies.
- Transit investment has a comparatively lower induced growth effect and is limited to the nature of transit infrastructure. Highways are ubiquitous, connecting many places to many other places, whereas transit is available mostly along a limited number of fixed route corridors, which connects only a limited number of places along a route.
- The impact of transit on growth is also less discernible because transit use represents only a modest share of overall travel in most places.
- Given the nature of the Highlands Region, it can be anticipated that extension of rail transit might have relatively modest land use impact, and even that impact would be felt predominantly in areas surrounding rail stations.
- The near-term impact of new rail service would most likely be an increase in land value around rail stations, while in the long term there may be significant changes in mode choice behavior and land use intensity.

- For any significant impact to materialize from rail expansion or service extension, supportive land use policies would have to be in place.
- The impact of new bus service is limited in research, and it is difficult to foresee a substantial impact on the Highlands in terms of land use or economic development, although such services may be able to bring forth short-term reduction in congestion on particular roadway segments if the service frequency is extremely high.
- Supplementary efforts, such as new or expanded park-and-ride facilities, would be required for any mode of transit to have a significant impact on mode share.

TRANSPORTATION DESIGN

Despite an already burdened transportation infrastructure, the Highlands Region continues to face ever-growing transportation demands. Solutions require more than conventional method which narrowly focuses on expanding roads and highways. By implementing innovative transportation design standards, new transportation projects can balance transportation and economic needs, while maintaining the goals outlined in the Highlands Act.

Residential Site Improvement Standards

The Residential Site Improvement Standards (RSIS) are developed by the New Jersey Department of Community Affairs in order to set improvement levels for streets, curbs, sidewalks, drainage facilities and utilities for road classifications including major and minor collectors and local roads. With respect to new residential subdivisions, the RSIS are the requirements which developers must follow, however, a "special area designation" may be applied by a municipality or group of municipalities exhibiting a distinctive character or environmental feature that by ordinance has been identified and a desire expressed to preserve and enhance it. The Highlands Act (Section 26) requires that the Council review the RSIS standards to evaluate consistency with the Regional Master Plan and where deficient define revised criteria.

Green Streets

The Highlands Act establishes the protection and restoration of natural resources as priority goals. One of the critical challenges of the transportation system is one of balancing regional transportation needs and environmental stewardship. Innovative approaches to roadway design put greater focus on ecological systems. Green Street approaches seek to design a street system that protects water resources in order to prevent the adverse affects of surface runoff. Surface runoff occurs when precipitation flows over the ground and impervious surfaces, such as sidewalks or streets, prevent natural saturation into the ground. Surface runoff can also absorb pesticides, fertilizers, petroleum substances or other harmful pollutants and flow into storm sewer systems or directly into surface water and groundwater bodies. Surface runoff can degrade water quality and negatively affect ecological habitats and human health.

Better, more efficient land use planning coupled with a strong land preservation effort are the best methods to prevent and minimize surface runoff on a large scale. Site design is also a key to reducing surface runoff pollution. One planning technique is to implement landscaped stormwater curb extensions which help filter pollutants while maintaining an aesthetic appeal. Filter strips and swales serve a similar purpose as a method for protecting the quality of groundwater and runoff. Both filter strips and swales use vegetation to remove pollutants from surface runoff. Another planning technique commonly used to minimize the impact of impervious surface is called cluster development, which identifies and protects environmentally sensitive lands while allowing development on a smaller relative

building footprint. Street trees and permeable surfaces can also reduce surface runoff while filtering many harmful pollutants.

Shared Parking

Parking lots account for a large portion of impervious surfaces, carrying harmful pollutants, sediment and garbage into nearby waterways. In the Highlands Region, typical suburban shopping centers have more land dedicated to parking or parking facilities than actual buildings. Sites with large parking lots are often located adjacent other sites with equally large parking lots. If these adjacent uses serve different purposes, parking lots may lie empty for extended periods of time In theory, less aggregate parking would be necessary by connecting and sharing the two sites. This concept called "Shared Parking" is used extensively in traditional neighborhood commercial settings and downtowns. In these locations, higher densities and mixed uses often allow people to park in a single spot and then walk from one destination to another, allowing the same parking spaces to be used by various uses. Shared Parking is usually accomplished through two approaches: contractual agreements between adjacent uses; and parking management districts where an entire district with multiple property owners would have access to all the parking spaces at any given time[25]

BASELINE TRANSPORTATION AND TRANSIT LAYER

To better understand the movement of people and goods throughout the Highlands Region, and to support the development of Regional Master Plan policies and long-term planning goals, a Baseline Transportation and Transit Layer was developed. The layer informed and refined the Land Use Capability Zone Map (LUC Zone Map), by identifying regional multimodal opportunities throughout the Highlands transportation network. The purpose was to better understand the nature of regional development patterns, and to identify existing interfaces between land use and roadway-transit networks that may inform future land use intensity. Areas with existing development that are also served by multi-modal transportation opportunities support RMP policies as lands potentially appropriate for development and redevelopment in support of smart growth principles.

Approach

The analysis considered the competing interests of various transportation modes including car, bus, train, pedestrian and bicycle. Additionally, major transportation corridors and multi-modal connections which support accessibility and mobility in the Highlands Region for existing and future populations were identified. The data were drawn from NJDOT, NJ Transit and additional research conducted by the Highlands Council.

The analysis identified regional roadway-transit networks that serve as broad north-south and east-west geographical bands representing significant regional roadway linear miles, NJ Transit rail and bus routes, and private carrier bus lines. The indicators for the analysis included: all Interstate, US and State roads, and select county highway roads, bus routes, rail stations, and park and ride facilities. These corridors and networks were used as an indicator of transportation system intensity in development of the LUC Zone Map, and represent links between population and networks of employment centers.

The Highlands Region includes many highway-oriented business corridors, which vary greatly in size and scale, but are all dependent upon flows of traffic and convenient access. These corridors provide important services to local residents. Due to the geography, size and development patterns that are characteristic of the Highlands Region, it was critical that the Baseline Transportation and Transit Layer

[25] Capitol Region Council of Governments, Shared Parking.
http://www.crcog.org/Publications/TCSP/Ch08_Fact%20Sheet_Parking.pdf

include multi-modal opportunities that are sensitive to the context of surrounding land uses.

The analysis incorporated an evaluation of lands adjacent to transit and roadway facilities within the Highlands Region by incorporating lands within one mile of train stations as well as developed lands within one-half mile of park and ride facilities, and one-quarter mile of roads.

The analysis then identified developed land features within these corridors and networks, and excluded rights-of-way, bridges and transportation communication stations from the developed land features for consistency with the Developed Lands Analysis performed for the LUC Zone Map analysis. The following Anderson Land Use/Land Cover Codes were not intended to be captured as residential and non-residential developed lands within the transportation system corridor and interchange analysis: 1400, 1410, 1419, 1462 and 1463.

The following six indicators were developed in support of the Baseline Transportation and Transit Layer:

1. **Transportation corridors** - Includes developed lands within a 1/4 mile buffer of significant US routes, state routes, and specified county routes. The corridors are derived from spatial data obtained from the New Jersey Department of Transportation (NJDOT) and include the following routes (note: Interstate routes 78, 287, 80 and 280 are limited-access highways and therefore were treated differently and excluded from this portion of the analysis):

• US routes, including routes 46, 206, 202 and 22

• State routes, including routes 24, 94, 31, 12, 173, 15, 10 and 57

• County roadways, including 510, 511, 512, 513, 517 and 519

2. **Interchanges and intersections** - Includes developed lands within a 1/2 mile buffer surrounding roadway interchanges and intersections. These interchanges and intersections are derived from spatial data obtained from NJDOT, and include the following:

• Interstate – Interchanges on Interstate routes 80, 287, 78 and 280.

• US routes – A US route that intersects with other US routes, State routes or county routes

• State routes – A State route that intersects with other State routes and county routes

• County routes -- A county route that intersects with other identified county routes

3. **Train station "inner core"** - Includes developed and undeveloped lands within a 1/2 mile "inner core" buffer of train stations in or within 1/2 mile of the Highlands Region. The NJ Transit rail stations in the Highlands Region that were considered include: the Boonton Line, Main Line & Bergen County Line, Morris & Essex Line, and Raritan Valley Line. Spatial data on transit lines and stations were acquired from NJ Transit.

4. **Train station "outer core"** - Includes developed and undeveloped lands within a 1 mile "outer core" buffer of train stations in or within 1 mile of the Highlands Region. The NJ Transit rail stations in the Highlands Region that were considered include: the Boonton Line, Main Line & Bergen County Line, Morris & Essex Line, and Raritan Valley Line. Spatial data on transit lines and stations were acquired from NJ Transit.

5. **Park & rides** - Includes all developed lands within a 1/2 mile buffer from all park and ride locations in or within 1/2 mile of the Highlands Region. Spatial data on park and ride locations were acquired from NJDOT.

6. **Bus routes** - Includes all NJ Transit and major private bus carriers in the Highlands Region that operate on a daily basis on any of the US, State or County routes used in the analysis. The presence of a routine bus route indicates the potential for transit opportunity. Spatial data were acquired from NJ

Transit, Morris County and Somerset County. Bus route data, maps and other information were collected from Sussex, Hunterdon, Bergen and Passaic Counties. Private bus providers were contacted in order to verify the presence of existing routes including Coach Bus, Short Line Bus, Lakeland Bus Lines and Trans-Bridge Lines.

Assigned Value of Transportation System

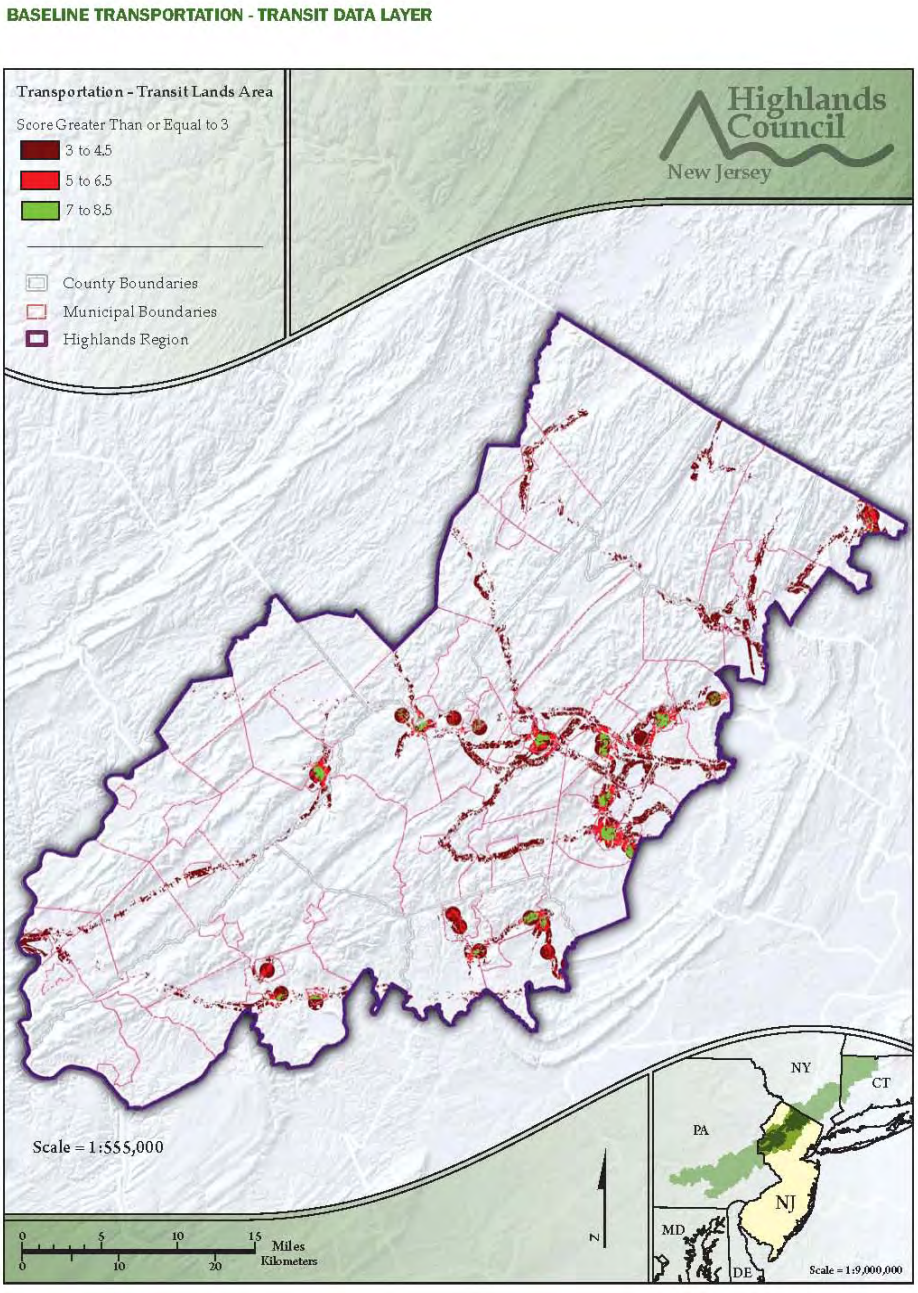
An assigned value of transportation system indicators was established in order to better refine the development of the LUC Zone Map, see Table 14 below. Each indicator was assigned a certain number of points based upon the significance of the transportation feature. The highest values were awarded to lands located near train stations and existing bus routes which contain the greatest opportunity for transit alternatives.

The scoring system is devised to reflect smart growth principles as compared to sprawl or piecemeal development patterns that limit multi-modal connections and transit density features. The land based features of the Baseline Transportation and Transit Layer were then parcelized to support further evaluation and refinement. Assigned values were then aggregated where multiple transportation features overlapped. For example, when lands adjacent to "Park and Rides" (1/2 point) were located in conjunction with "Transportation Corridors" (1 point) and "Bus Routes" (2 points), the total assigned value for those lands would be 3.5 points. A minimum threshold of 3 points was established in order to recognize regionally "transit rich" lands, and only those areas with an aggregate score of 3 or more were used to inform the Baseline Transportation and Transit Layer. Figure 12 entitled "Baseline Transportation - Transit Layer" highlights these multi-modal areas in the Region and ultimately informed the evaluation of lands appropriate for development and redevelopment as well as potential development credit receiving zones.

Table 14: Assigned Value of Transportation System Indicators

Transportation Indicators:	**Train Station "Inner Core"**	**Train Station "Outer Core"**	**Bus Routes**	**Transportation Corridors**	**Intersections & Interchanges**	**Park & Rides**
Assigned Value (Points)	**4**	**2**	**2**	**1**	**1**	**1/2**

Figure 11


BASELINE TRANSPORTATION - TRANSIT DATA LAYER
Transportation - Transit Lands Area
Score Greater Than or Equal to 3
3 to 4.5
5 to 6.5
7 to 8.5
County Boundaries
Municipal Boundaries
Highlands Region
Highlands Council
New Jersey
Scale = 1:555,000
0 5 10 15 Miles
0 10 20 Kilometers
N
NY
CT
PA
NJ
MD
DE
Scale = 1:9,000,000

TRANSPORTATION PROJECT AND FUNDING OVERVIEW

TRANSPORTATION IMPROVEMENT PROGRAM

Federal law requires that all transportation projects financed with federal funds appear in a Transportation Improvement Program (TIP). The TIP is a four-year schedule of transportation improvements for which planning has been completed. The North Jersey Transportation Planning Authority (NJTPA) is the Metropolitan Planning Organization (MPO) that administers federal transportation funding for the 15 sub-regions of northern New Jersey (the counties of: Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren; and the cities of Newark and Jersey City) which includes the entire Highlands Region. Because requirements for receiving funding mandate that transportation projects be listed in the TIP, there is a commitment by the NJDOT, NJ Transit and the sub-regions to implement specific projects. The project planning, scoping, and preliminary design work that will be conducted during the current fiscal year is done collaboratively with the sub-regions, NJDOT, NJ Transit, the transportation management associations, special interest groups, stakeholders, and the general public.

Federal Funding for TIP

TIP funding includes federal, state and other miscellaneous sources. Federal funds are primarily derived from the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), adopted on August 10, 2005, authorizes that federal funding. During fiscal year 2007, $1.21 billion in federal funding will be allocated to the TIP (administered by NJTPA), which includes $723 million for NJDOT projects and $489 million for NJ Transit projects. In addition, Congestion Mitigation Air Quality (CMAQ) funds transportation projects or programs that will contribute to attainment of the NAAQS with a focus on reducing ozone and carbon monoxide. Funds for fiscal year 2007 will total $458.5 million throughout the NJTPA region[26]. The Transportation Improvement Program 2007 – 2010 is summarized for Highlands counties in Appendix D. The Transportation Improvement Program for Fiscal years 2009 – 2012 and the accompanying Air Quality Conformity Determination are being considered by the North Jersey Transportation Planning Authority (NJTPA) in July 2008.

State and Other Funding for TIP

The Transportation Trust Fund (TTF) is New Jersey's primary source of funding for highway, bridge, transit and local expenditures providing $1.6 billion statewide per year beginning fiscal year 2007. Other funding includes the Casino Revenue Fund, and the Metro North funds. State and other funding in total will provide $1.27 billion to the northern New Jersey TIP during fiscal year 2007 ($698 million to NJDOT and $570 million to NJ Transit)[27].

NJDOT DIVISION OF LOCAL AID AND ECONOMIC DEVELOPMENT

The NJDOT Division of Local Aid and Economic Development (Local Aid) advances projects that enhance safety, renew the aging infrastructure and the State's economy and support new transportation opportunities. Local Aid works with county and municipal government officials to improve the efficiency and effectiveness of the State's transportation system. The fiscal year 2007 Local Aid and

[26] *An Overview of the FY 2007 - 2010 Transportation Improvement Program.* - Federal Funding - North Jersey Transportation Planning Authority

[27] *An Overview of the FY 2007 - 2010 Transportation Improvement Program.* - TTF - North Jersey Transportation Planning Authority

Economic Development projects in Highlands counties is summarized in Appendix C.

Federal Funding for Local Aid

Local Aid and/or the Metropolitan Planning Organizations administer seven federal aid programs. The seven programs, along with the estimated funding levels for fiscal year 2007, are listed as follows[28]:

- Bikeways ($4 million) - Coordinates plans for promotion of bicycling and bikeways with other state agencies and local governments in order to maximize use of roads, streets, parks and other publicly owned lands, and other resources.
- Local Scoping Program ($5 million) - Provides federal funds directly for the advancement of projects through the National Environmental Policy Act (NEPA) and preliminary engineering, therefore making a project eligible for inclusion in Statewide Transportation Improvement Program (STIP)
- Local Lead Program ($70 million) - Provides funding to advance projects through final design, right of way and construction.
- Transportation Enhancement Program ($10 million) - Funds projects which are designed to foster more livable communities, preserve and protect the environmental and cultural resources and promote alternative modes of transportation.
- Transit Village Program ($2 million) - Designed to assist municipalities which have been formally designated Transit Villages by the Commissioner of Transportation and the inter-agency Transit Village Task Force
- Safe Routes to Schools Program ($15 million - total for years 2005 - 2010) - Enables and encourages children, including those with disabilities, to walk and bicycle to school.
- Local Safety Program ($2.5 million) - Advances safety initiatives on county and local transportation facilities, especially high impact safety improvements on county and local roadways.

State and Other Funding for Local Aid

The TTF is also the State's primary funding mechanism for Local Aid. Total funding provided in fiscal year 2007 is roughly $177 million annually which then funds the following four programs[29]:

- Municipal Aid Program ($78.75 million) - Funding for this program is appropriated by the State Legislature for municipalities in each county based on formula for road improvement projects such as resurfacing, rehabilitation or reconstruction.
- County Aid Program ($78.75 million) - Funding for this program is appropriated by the State Legislature annually for the improvement of public roads and bridges.
- Discretionary Funding ($17.5 million) - Established to address emergencies and regional needs throughout the State. Any county or municipality may apply.

[28] Local Aid and Economic Development - Federally Funded Programs. New Jersey Department of Transportation. http://www.state.nj.us/transportation/business/localaid/fedaid.shtm

[29] Local Aid and Economic Development - State Funded Programs. New Jersey Department of Transportation.http://www.state.nj.us/transportation/business/localaid/stateaid.shtm

- Center's of Place Program ($2 million) - Designed to assist municipalities who have formally participated in implementation of the New Jersey State Development and Redevelopment Plan (SDRP)

OVERVIEW OF REGIONAL TRANSPORTATION PLAN – TRANSIT PROJECTS

Transit improvement in New Jersey, whether the planned improvements are within or outside the Highlands region, may affect the region if the magnitude of improvement is large and it affects service on the rail lines and bus routes serving the Highlands. According to the Access and Mobility 2030 plan, the most recent Regional Transportation Plan of the North Jersey Transportation Planning Authority (NJTPA), there are at present as many as 15 transit expansion candidates in northern New Jersey. Some of these candidates are not likely to materialize into construction projects in the near future, and only a handful of them could potentially have a discernible impact on the Highlands Region.

Among those listed NJTPA's Access and Mobility 2030 plan, the transit expansion candidates that are relevant to the Highlands Region are the following:

1. The Trans-Hudson Express tunnel (THE tunnel), also known as Access to the Region's Core, or ARC project
   - It will improve service on all commuter rail lines in New Jersey and create new transit markets.
   - It can be expected that as a result of the new tunnel, there will be at least a modest increase in ridership on all NJ Transit lines connecting the Highlands, namely, the Montclair-Boonton Line, the Morristown Line, the Gladstone Branch Line, the Raritan Valley Line, and the Main/Bergen County Line.
   - Many places within the Highlands with rail service to the NY City, especially those west of Dover, do not have opportunities for single-seat rides. With the construction of the THE tunnel, the level of service on the rail lines will improve, which in turn will make the NY City more attractive for the workers of the Highlands. To what extent the attractiveness increases will depend on the operational plan being developed by NJ Transit.
   - During the AM peak hour, there will be seven additional trains per hour on the five lines connecting the Highlands Region to NY City, of which the greatest increase in service will occur on the Raritan Valley Line and the Main/Bergen County Line.
   - The project anticipates increases in service will increase ridership on the lines by a total of almost 40,000, or 45%.
   - The Main/Bergen County Line will experience the highest increase in ridership, followed by the Raritan Valley Line and the Montclair-Boonton Line.
   - While there may be a certain amount of induced commute to the NY City as a result of increase in transit service from the new tunnel, additional efforts would be needed to enhance transit mobility within the Region, especially to large employment centers like Parsippany-Troy Hills, Morristown, and Hanover.
   - The project once implemented will provide opportunities for regional tourism by moving visitors and residents of the Highlands to more places quicker with increased service and create opportunities for multi-modal connections.

2. The Lackawanna Cutoff
   - The Lackawanna Cutoff is another major transit expansion candidate that could have a significant impact on the Highlands. This expansion, when completely implemented, would

reinstitute an 88-mile single-track passenger rail service on the abandoned rail right of way of the Lackawanna Cutoff and existing freight right of way all the way from Port Morris, New Jersey, to Scranton, Pennsylvania.

- The project would essentially connect the Morristown and Montclair-Boonton Lines to Scranton, PA, via the Delaware Water Gap.
- The project would require complete reconstruction of the line, including track and signal improvements, as well as construction of new stations, parking facilities, and a train storage yard. The details of the project scope are not complete at this time.
- According to information obtained from the NJTPA, a draft Environmental Assessment is currently being circulated for public comment and has not been finalized.
- While one of the major arguments in favor of the Cutoff is congestion relief on Interstate-80, it could also induce new land developments within the Highlands because of enhanced rail service to both Pennsylvania and New York. However as stated previously transit induced growth is limited in scope and in proximity to rail stations.
- The recent approval by the NJTPA Board of Trustees of a Locally Preferred Alternative for Minimum Operable Segment (MOS) of the Lackawanna Cutoff, that would extend service for 7.3 miles from Port Morris to Andover, New Jersey, signals that extension of service to this segment is imminent and may happen within a few years from now.
- The impact of this limited extension to Andover would be minimum, however, it may provide future opportunities for regional tourism connections further west in the Region.

3. <u>The NYSC & W Railroad from Hackensack to Hawthorne</u>
   - This transit expansion project would involve a new rail service along the New York Susquehanna & Western track alignment between Hackensack (Bergen County) and Hawthorne (Passaic County).
   - Although this transit expansion candidate is not located within the Highlands Region, it may have a modest effect on the region because of its close proximity to the region and possible future extension of this service to Sparta, Sussex County.
   - This project is currently not listed in NJ Transit's web site on transit system expansion.

4. <u>The NYSC & W Railroad from Hawthorne to Sparta</u>
   - This candidate transit expansion project envisions restoration of commuter rail service along the NYS&W right-of-way from Hawthorne in Passaic County to Sparta in Sussex County.
   - The project would include major upgrading of tracks along a 40-mile segment of railway, construction of several passing sidings, construction of nine new stations, installation of a new signal system, and construction of a storage yard.
   - This transit expansion candidate is not listed in the NJ Transit's web site on transit system expansion and is not likely materialize into actual extension in the near future.
   - However, if and when completed, it would have a major impact on the Highlands Region because it would provide direct access from the northern part of the Highlands to northeastern New Jersey.

5. <u>The Phillipsburg Extension of the Raritan Valley Line</u>
   - The study is a transit expansion candidate by the NJTPA's 2030 Regional Transportation Plan, and will investigate extension of the Raritan Valley Line from its current terminus at High Bridge to Phillipsburg.
   - The study is a follow up to the recently completed NJTPA I-78 Corridor study.

- The NJ Transit has acquired the right of ways for this project.
- An extension of the line would affect the southern portion of the Highlands along the Route 78 corridor and may support additional multi-modal connections on the Route 57 and 31 corridors.
- The projects land use and traffic impacts on the Region would be slight.
- The study is anticipated to be completed in early 2009 and does not appear in NJTPA's PDWP or New Jersey Transit's web site on transit expansion projects.

6. The West Trenton Line
   - This transit expansion candidate would restore commuter rail service for 21 miles on the West Trenton Line between Bridgewater in Somerset County and Ewing in Mercer County.
   - A draft Environmental Assessment (EA) identifying the impacts of implementing commuter rail service on the existing right of way was submitted to FTA in 2005. The draft EA was revised in 2006 and made available for public comment at the end of 2007.
   - The project is listed in both NJTPA's PDWP and NJ Transit's web site on transit expansion projects.
   - The location of the proposed expansion suggests that its impact on the Highlands would be minimal as it would mainly impact that part of Somerset County that is outside of the Region.

7. The Northwest NJ Bus Study
   - This is an on-going study jointly undertaken by the North Jersey Transportation Authority and New Jersey Transit, and may have a significant impact on the Highlands in the near and distant futures.
   - The study has the potential to generate transit projects that would address the travel needs of residents and workers of the Highlands Region that travel to places within the Region.
   - The Transportation Model for the Highlands region indicates that 72% of the workers living in the Highlands commute to employment centers within the Region, especially to those in the eastern part of Morris County, the study should particularly focus on generating transit projects that provide good access to these employment centers from places within the Highlands.
   - The solutions from this study are perceived as short and medium term solutions by NJTPA and NJ Transit.
   - The outreach component of the study will be key to its success and actual project development in the coming years. With appropriate outreach and coordination among the stakeholders, including the Highlands Council, this study could help generating transit projects that would be vital for promoting transit and ridesharing, alleviating congestion on highways such as Rt. 23 and Rt. 15, and developing transit-oriented land uses as well as cluster and infill developments.

PROGRAMS FOR LOCAL TRANSPORTATION IMPROVEMENT

The following is a list of programs available to municipalities and counties seeking additional funds and technical assistance in order to implement transportation improvements that connect to smart growth land use principles. The list includes funding from Federal, State, Local and non-profit resources:

- **Bicycle/Pedestrian Planning Assistance** - NJDOT program which provides municipalities with consultant expertise in the professional disciplines of transportation and pedestrian/bicycle planning in order to develop comprehensive local circulation elements.

- **Brownfield Development Area Initiative (BDA)** - Under the innovative Brownfield Development Area initiative, NJDEP works with selected communities affected by multiple Brownfields to design and implement remediation and reuse plans for these properties simultaneously, so that remediation and reuse can occur in a coordinated fashion.
- **Brownfields Economic Development Initiative (BEDI)** - The Brownfields Economic Development Initiative, administered by the U.S. Department of Housing and Urban Development, is designed to assist cities with the redevelopment of abandoned, idled and underused industrial and commercial facilities where expansion and redevelopment is burdened by real or potential environmental contamination.
- **Community Development Block Grant Program (Small Cities)** - Community Development Block Grant (CDBG) funds, administered by the Department of Community Affairs, are used for a wide range of community development activities directed toward neighborhood revitalization, economic development, and improved community facilities and services.
- **Congestion Mitigation and Air Quality Program** - Congestion Mitigation and Air Quality (CMAQ) funds, administered by the U.S. Department of Housing and Urban Development, are focused primarily on transportation control measures (TCMs).
- **County Aid Program** - NJDOT County Aid funds are appropriated by the Legislature annually for the improvement of public roads and bridges under county jurisdiction. These funds are allocated to New Jersey's 21 counties by a formula that takes into account road mileage and population. This program is administered by the NJDOT Division of Local Aid and Economic Development.
- **Discretionary Aid Program** - The Discretionary Aid Program provides funding to address emergency or regional needs throughout the state. Any county or municipality may apply at any time. This program is administered by the NJDOT Division of Local Aid and Economic Development.
- **Downtown New Jersey** - Downtown New Jersey is a nonprofit organization that helps to support, guide and lead efforts at downtown revitalization throughout New Jersey. DNJ provides informational and educational opportunities; tracks judicial and legislative issues which would affect the success of New Jersey's downtown commercial districts; and fosters communication among business, political and professional leadership.
- **Job Access and Reverse Commute Grants** - The JARC program consists of two components, Job Access and Reverse Commute. The Access to Jobs Program provides competitive grants to local governments and non-profit organizations to develop transportation services to connect welfare recipients and low-income persons to employment and support services. Reverse Commute projects provide transportation services to suburban employment centers from urban, rural and other suburban locations for all populations.
- **Local Aid for Centers of Place** - This funding is a NJDOT program designed to assist municipalities who have formally participated in implementation of the New Jersey State Development and Redevelopment Plan (SDRP). Participation of municipalities in the SDRP ensures eligibility to compete for funds in the program. This program is administered by the NJDOT Division of Local Aid and Economic Development.

- **Locally Initiated Bicycle Projects** - This program provides funds for municipalities and counties for the construction of bicycle projects. This program is administered by the NJDOT Division of Local Aid and Economic Development
- **Locally Initiated Pedestrian Projects** - This program provides funds for municipalities and counties for the construction of pedestrian access and safety improvements. The program is administered by NJDOT's Division of Local Government Services.
- **Local Transportation Planning Assistance Program (LTPA)** - The LTPA program provides municipalities with consultant expertise in the professional disciplines of transportation and land use planning to develop local circulation elements, access management plans, local traffic calming studies, and other transportation related planning initiatives. This Program is administered by the Division of Transportation Systems Planning and Research, Bureau of Systems Development and Analysis (BSDA).
- **Main Street New Jersey** - Main Street is a comprehensive revitalization program that promotes the historic and economic redevelopment of traditional business districts in New Jersey. Every two years the New Jersey Department of Community Affairs accepts applications and designates selected communities to join the program.
- **Municipal Aid Program** - Municipal Aid funds are appropriated by the Legislature annually for the improvement of public roads and bridges under municipal jurisdiction. This program is administered by the NJDOT Division of Local Aid and Economic Development.
- **NJ Transit Capital Programs** - A municipality seeking capital improvements to NJ TRANSIT bus and rail transit infrastructure may write a letter to the agency describing the problem area. NJ TRANSIT will assess the problem area and will evaluate possible capital improvements intended to address it.
- **NJ Transit Community Shuttle Program** - NJ Transit's Community Shuttle Program offers a community the opportunity to provide its residents with shuttle service to and from a rail station, major bus corridor or a light rail station, during "peak" periods (6-9 a.m. and 4-7 p.m.).
- **NJ Transit Local and Community Transportation Programs** - The NJ TRANSIT Service Planning and Development area administers various federal grant programs and passes funding to sub-recipients, including counties, municipalities and private non-profit agencies.
- **Pedestrian Safety Initiative** - NJDOT created a five year fund to provide for pedestrian safety projects and improvements. Funds will be used for traffic calming, and sidewalk and intersection improvements. It will also fun programs to raise pedestrian and driver awareness.
- **Safe Routes to School** - Safe Routes to School is a new federal-aid program. Its purposes are to enable and encourage children, including those with disabilities, to walk and bicycle to school. In New Jersey, the program is coordinated by the Division of Local Aid and Economic Development.
- **Safe Streets to School** - This funding is available for communities seeking to improve the safety of children walking to school, and encourage more children to walk to school. This program is administered by the NJDOT Division of Local Aid and Economic Development.

- **Smart Commute Initiative** - This program, designed to encourage state residents to consider homeownership options near public transportation, is supported by the New Jersey Association of Realtors and a range of local and national lending institutions.
- **State and Community Highway Safety Grants** - State and Community Highway Safety grants are apportioned to the States through the National Highway and Traffic Safety Administration to pay for the non-construction costs of highway safety programs aimed at the reduction of injuries, deaths, and property damage from motor vehicle accidents.
- **Transit Village Initiative** - This program provides funds for municipalities and counties for the construction of pedestrian access and safety improvements. The program is administered by NJDOT's Division of Local Government Services.
- **Transportation, Community, and System Preservation (TCSP) Program** - States, metropolitan planning organizations, local governments, and tribal governments are eligible for discretionary grants to carry out eligible projects to integrate transportation, community, and system preservation plans.
- **Transportation Enhancements** - The Transportation Enhancements program funds community-based projects that expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic and environmental aspects of the transportation infrastructure. This program is administered by the NJDOT Division of Local Aid and Economic Development.

Transportation Improvement Program - Each of New Jersey's three MPOs is responsible for preparing a Transportation Improvement Program (TIP), a list of all transportation projects and programs of the New Jersey Department of Transportation, the New Jersey Transit Corporation, and individual counties and municipalities, to be funded in the next three fiscal years.

TECHNICAL FINDINGS

Inefficient land use in the Highlands Region has been characterized by low-density type development with uses separated over long distances. These patterns have helped shape a transportation system that is largely dependent upon automobile travel which has led to increased levels of congestion, longer commutes (measured in distance and time), vast areas of impervious surfaces, and degradation of natural resources and overall quality of life.

Following smart growth principles and efficient land use policy characterized by compact, mixed use development, higher densities and a more compact built environment, the Highlands Region can create the circumstances needed to promote more alternatives to automobile travel.

A strong connection between land use planning and transportation system planning is fundamental to supporting efficient land use patterns and encouraging non-vehicular modes of transportation such as pedestrian and bicycle. By linking circulation plan and land use elements, municipalities and counties can promote smart growth principles that are consistent with the goals of the Highlands Act. Building a stronger connection between land use and transportation planning would also encourage non-vehicular modes of transportation such as pedestrian and bicycle, and promote shared parking where possible and practical.

Municipal and county transportation plans can be used in order to coordinate local, county, and regional transportation initiatives and long-term transportation network needs. A comprehensive approach to transportation planning would also include the identification of planned, ongoing, and future

transportation improvements in a coordinated effort with other agencies, stakeholders, and general public. Emphasizing environmental implications when considering future transportation improvements helps to mitigate negative impacts on critical natural resources by minimizing impervious surfaces, developing low impact development techniques, and providing for alternative modes of transportation.

In order to ensure the safe and secure movement of people and goods it is important that transportation improvements incorporate safety features such as dedicated right-of ways and safe connections for pedestrians and bicyclists, traffic calming measures, and safe routes for children to travel to and from schools.

Economic development opportunities should be supported by ensuring that transportation planning, facilities, and linkages support regional development, redevelopment, and agriculture and tourism needs. The utilization of brownfields and greyfields sites, especially when located near major transportation links, can help to enhance environmental features while creating multi-modal transportation connections. The identification of abandoned rail lines for potential reactivation may serve to assist in the movement of people and goods as well as create new economic opportunities.

Site-specific design standards should be implemented to enhance roadway design, sidewalks, parking lots and context sensitive design standards. Through Residential Site Improvement Standards (RSIS), a "special area designation" may be applied in the Highlands Region in order to preserve and enhance a distinctive character or environmental feature. The Highlands Act (Section 26) requires that the Council work with NJDCA, NJDEP, and NJDOT to review the RSIS standards and evaluate consistency with the Regional Master Plan and where deficient, define revised criteria.

The Highlands sub-area model - Baseline Roadway Capacity Assessment - provides information on regional transportation conditions. Updating and improving traffic input data for the model can ensure accuracy of output over time. The Highlands Conformance standards and Smart Growth and Community Design Guidelines should also continue to be evaluated and assessed in support of regional transportation needs.

Coordination and consistency among state and federal agencies will be a critical component to the implementation of the Regional Master Plan. The Highlands Council should look to coordinate transportation improvements, transit initiatives, and goods movement with NJDOT, NJ Transit, North Jersey Transportation Planning Authority (NJTPA), and other agencies and stakeholders as well as the general public. The Highlands Council should also work with the NJDCA, NJDEP and NJDOT in order to establish changes which might be necessary upon evaluation of the Residential Site Improvement Standards.

SUPPORTING INFORMATION

Acknowledgments
Glossary
References
Appendices

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GLOSSARY

Baseline Transportation and Transit Layer - The layer informed and refined the Land Use Capability Zone Map (LUC Zone Map), by identifying regional multimodal opportunities throughout the Highlands transportation network.

Brownfields – Land previously used for industrial purposes, or certain commercial uses, and that may be contaminated by low concentrations of hazardous waste or pollution and has the potential to be reused once it is cleaned up. Land that is more severely contaminated and has high concentrations of hazardous waste or pollution, such as Superfund or hazardous waste sites, are uniquely classified.

Expressways - partially limited access roadway facilities with generally high speed limits, grade separated interchanges with other major facilities and at-grade intersections with minor facilities. Portions of NJ 15 in Sussex County falls into this category

Filter Strips - Usually a row or "strip" of vegetation used on streets, sidewalks or other impervious surfaces as a way to buffer surface pollutants and retain stormwater or surface runoff.

Freeways - limited access roadway facilities (including toll facilities) with generally high speed limits (e.g., 55-65 mph), no at-grade intersections, and no traffic signals on the main carriage lanes. I-78, I-80 and I-287 fall into this category.

Green Streets – An innovative approach to street design which seeks to integrate natural processes, especially with regard to the management of street runoff. Existing streets can be designed to provide direct environmental benefits aesthetically into the downtown or suburban streetscape.

Grayfields – Retail or commercial areas that are older and economically obsolete. Grayfields may include outdated buildings in disrepair, large parking lots, and fail to generate the revenue that would justify their continued use. They may provide for infill opportunities and inter-parcel vehicular access.

Growth Inducing - The term induced growth is commonly used when considering the potential impacts of infrastructure investment and usually implies land development that may occur as a secondary effect of a project.

Home-based Work (HBW) - Transportation term used to describe vehicle trips originating from home and arriving at place of work

Home-based Shopping (HBSH) - Transportation term used to describe vehicle trips originating from home and arriving at a shopping location

Home-based Other (HBO) - Transportation term used to describe vehicle trips originating from home and arriving at locations other than work or shopping location

Impervious Surface - Artificial structures such as pavements and building roofs which replace naturally pervious soil with impervious construction materials. They are an environmental concern because, with their construction, a chain of events is initiated that modifies urban air and water resources.

Intermodal – Transportation planning and infrastructure that reflect a focus on connectivity between multiple transportation choices (modes). It emphasizes connection, choices, coordination, and cooperation.

Inter-parcel access – The creation of alternative road and sidewalk connections between properties that do not solely include access to a major thoroughfare but enhance access and ease congest

Local Collectors - roadways with moderately low speed limits (e.g., 25-35 mph) and few parking restrictions that serve mainly to collect and distribute traffic from principal, major, and minor facilities to

local streets and local property access to adjacent streets and properties.

Low Impact Development (LID) Best Management Practices – Low Impact Development is an environmentally sensitive approach to storm water management that emphasizes conservation and the use of existing natural site features integrated with distributed, small scale storm water controls to more closely mimic natural hydrologic patterns in residential, commercial and industrial settings.

Major Arterials - arterials with moderate speed limits (e.g., 30-45 mph), raised center medians with turning bays at intersections, some parking restrictions that mainly serve through traffic although some local property access is permitted. The 500 Series County roads, with median, will fall into this category

Minor Arterials - arterials with moderately low speed limits (e.g., 25-35 mph) and few parking restrictions that serve some through traffic, some distribution of traffic from principal and major facilities, and some local property access. Most 600 series roads fall into this category

Mode - Used describe a "mode" of transportation such as vehicle, train, bus, bicycle or pedestrian.

Multi-modal - Used in transportation planning to describe many modes of transportation connecting or converging into an accessible location.

New Jersey Department of Community Affairs (NJDCA) - A State agency created to provide administrative guidance, financial support and technical assistance to local governments, community development organizations, businesses and individuals to improve the quality of life in New Jersey

New Jersey Department of Environmental Protection (NJDEP) - A state agency created in order to permit coordinated and effective governmental action, for protection of the environment by the systematic abatement and control of pollution, through integration of research monitoring, standard setting, and enforcement activities

New Jersey Department of Transportation (NJDOT) – serves those who live, work and travel in New Jersey and seeks to ensure a safe, efficient, balanced and environmentally sound transportation system.

New Jersey Transit (NJ Transit) – is New Jersey's public transportation corporation with a mission to provide safe, reliable, convenient and cost-effective transit service covering a service area of 5,325 square miles, linking major points in New Jersey, New York and Philadelphia.

NJ Transit "Transit Score Program" – Developed by NJ Transit to assist municipalities and other state agencies in planning for future land use patterns that support transit in the future to accommodate growth. The Transit Score is a numerical index, which evaluates the potential for transit ridership in New Jersey.

Non-Home-based (NHB) - Transportation term used to describe vehicle trips not originating from home and arriving anywhere

North Jersey Transportation Planning Authority (NJTPA) – is the federally authorized Metropolitan Planning Organization for 6 million people in the 13-county northern New Jersey region. It oversees transportation improvement projects and provides a forum for interagency cooperation and public input into funding decisions.

Pedestrian Safety Initiative – NJDOT funded program seeking pedestrian safety improvements on state and local roads in addition to raising pedestrian awareness

Principal Arterials - arterials with moderately high speed limits (e.g., 35-50 mph), raised center medians with turning bays at intersections, parking restrictions that mainly serve through traffic rather than local property access. Portions of NJ 23 and U.S. 206 fall into this category.

Roll out Safe Routes to School Program – provides funding to local governments to create safer

walkways, bikeways and street crossings near schools

Residential Site Improvement Standards (RSIS) – The Site Improvement Advisory Board established by (C.40:55D-40.3) and the Department of Community Affairs in accordance with (C.40:55D-40.1 et seq.) develops and oversees the site improvement standards for residential development known as the Residential Site Improvement Standards (RSIS).

Smart Growth – A strategic approach to development decisions which uses "planning to guide, design, develop, revitalize and build communities for all that: have a unique sense of community and place; preserve and enhance valuable natural and cultural resources; equitably distribute the costs and benefits of development; expand the range of transportation, employment and housing choices in a fiscally responsible manner; value long-range, regional considerations of sustainability over short term incremental geographically isolated actions; and promotes public health and healthy communities." *American Planning Association, Policy Guide on Smart Growth*

Sustainable – Capable of equitably meeting the vital human needs of the present without compromising the ability of future generations to meet their own needs by preserving and protecting the area's ecosystems and natural resources. "The concept of sustainability describes a condition in which humans use of natural resources, required for the continuation of life, is in balance with Nature's ability to replenish them." *American Planning Association, Policy Guide on Planning for Sustainability*

Traffic Analysis Zones (TAZ) - The NJRTM traffic analysis zone (TAZ) system is a 1990 census-tract based and has 1,377 zones within the 13-county region. The traffic analysis zones represent the land use activities in a specific geographic area represented by that zone

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APPENDICES

A Roadway Capacity Assessment
B Air Quality Conformity Analysis
C Local Aid and Economic Development Projects in Highlands Counties (FY2007)
D Transportation Improvement Program (FY 2007 – 2010)

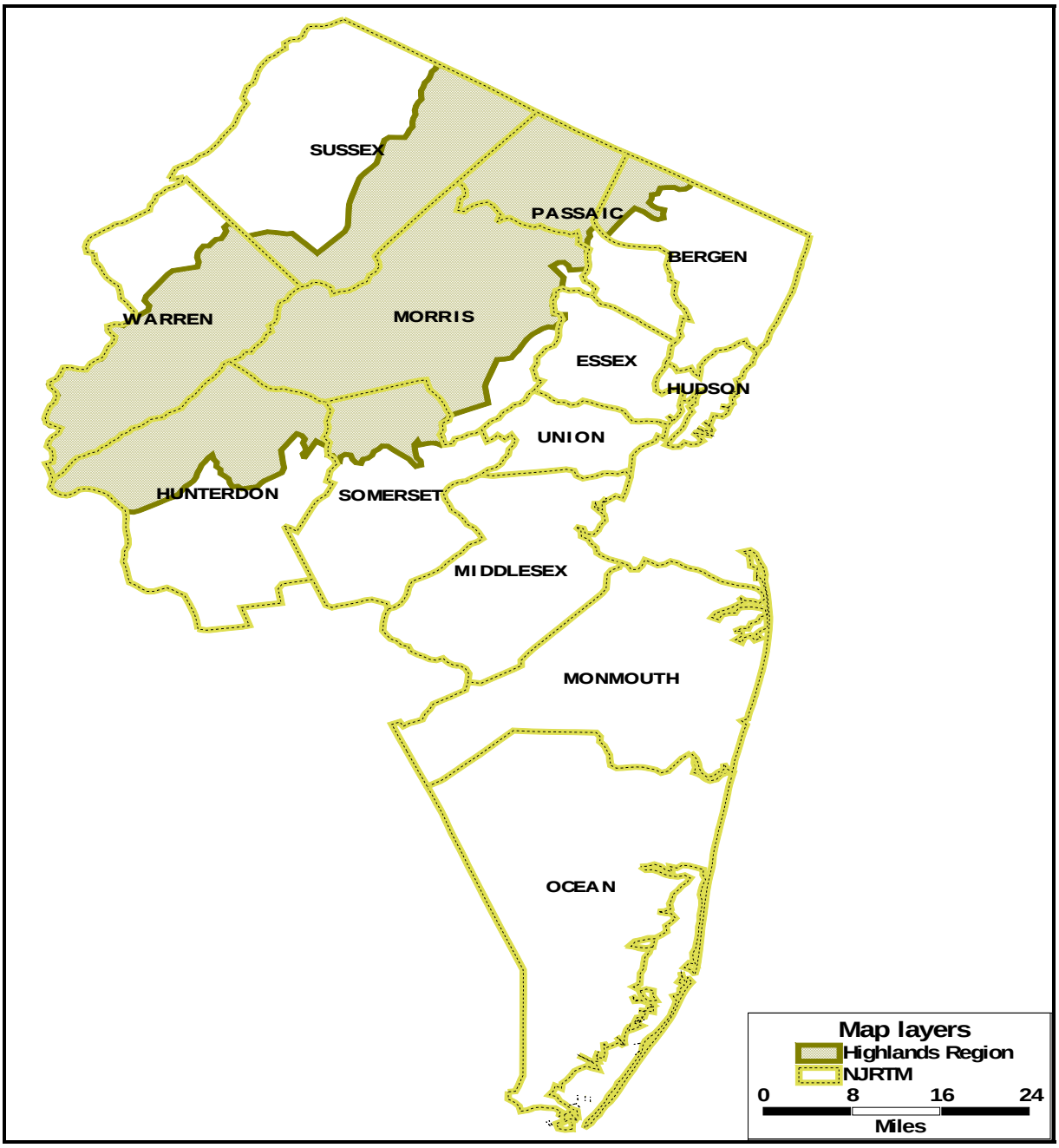
APPENDIX A
Roadway Capacity Assessment
(Full Report)

EXECUTIVE SUMMARY

This section provides a summary of the Roadway Capacity Assessment which was used in order to establish the baseline for higher-level roadway conditions in the Highlands Region. The New Jersey Highlands Water Protection and Planning Council (Highlands Council) consulted with the New Jersey Department of Transportation (NJDOT) and other agencies, as well as technical and local stakeholders, in order to develop an approach and methodology for this assessment. The initial phase of the assessment includes an overview of the Highlands sub-area transportation planning model.

The Roadway Capacity Assessment was based on a Highlands Sub-Area model, which summarizes the existing vehicular travel patterns and traffic conditions for the Highlands Region for the base year 2002 and was developed from the larger North Jersey Regional Transportation Model (NJRTM). The NJRTM is a regional transportation model that covers thirteen counties in Northern and Central New Jersey including the entire Highlands Region as shown in Figure 1. It currently is the primary analysis tool for transportation planning in the region. The Highlands sub-area model was validated against existing traffic counts for the base year. The model identified major origin and destination trips generated in the Highlands Region, and reported on roadway capacity conditions during AM and PM peak periods. Using this data as a baseline, the model is able to assess transportation impacts associated with various potential future growth scenarios.

The Highlands Council will continue to coordinate transportation planning with agency partners and county/municipal stakeholders in development of the RMP.



Note: Figure prepared for New Jersey Highlands Council

Figure 1 - Highlands Region Portion of Area NJRTM

INTRODUCTION

The NJRTM traffic analysis zone (TAZ) system is 1990 census-tract based and has 1,377 zones within the 13-county region. The traffic analysis zones represent the land use activities in a specific geographic area represented by that zone. In the NJRTM these activities are represented in the form of population, households, number of employees by type of employment, and average household income by TAZ.

The NJRTM follows the traditional four-step transportation planning process that involves:

1. Trip generation – estimates total person trip activity at each TAZ
2. Trip distribution – allocates trips between origin and destination
3. Mode choice – allocates trips among the available travel modes
4. Highway assignment – assigns trips onto the transportation network

The NJRTM model methodology is described in sections:

1. Highway Network Modification Summary – The highway network modification process summarizes the network characteristics in terms of number of lanes, total center-lane miles and total lane miles

2. Socioeconomic Data for the Base Year 2002 – The socioeconomic data for the base year relied on United States Census 2002 estimates for population; the data and assumptions are outlined and discussed

3. Model Validation – The model validation procedure includes an evaluation of the volume/count ratios that were obtained for the observed volumes in comparison to estimated volumes

4. Trip Distribution Summary – Trip distribution patterns were analyzed in the base 2002 model and final daily vehicle trip tables were summarized into major groupings The model effort assisted in identifying the major origins and destinations of trips generated within the Highlands

5. Highway Assignment-Network Performance – The results of the highway assignment were then analyzed in order to develop a summary of various highway network performance measures. The model performance measures include Vehicle Miles Traveled, (VMT) Vehicle Hours Traveled, (VHT), Average Speed, Average Trip Length, and Traffic Congestion.

LEGAL REQUIREMENTS FOR INCLUSION IN THE REGIONAL MASTER PLAN

In accordance with Section 11 of the Highlands Water Protection and Planning Act (Highlands Act), the Regional Master Plan must include a transportation component. The Highlands Council is incorporating its Highlands transportation planning into the Smart Growth Component in order to address the following requirements of Section 11 of the Highlands Act:

11. a. (5) *A transportation component that provides a plan for transportation system preservation, includes all federally mandated projects or programs, and recognizes smart growth strategies and principles. The transportation component shall include projects to promote a sound, balanced transportation system that is consistent with smart growth strategies and principles and which preserves mobility and maintains the transportation infrastructure of the Highlands Region. Transportation projects and programs shall be reviewed and approved by the council in consultation with the Department of Transportation prior to inclusion in the transportation component;*

11. a. (6) *A smart growth component that includes assessment, including…infrastructure investments, … transportation, … and transit villages.*

ROADWAY CAPACITY ASSESSMENT

HIGHWAY NETWORK MODIFICATIONS

This section provides a brief description of the modifications made to the NJRTM network. The network checks are performed for quality assurance, and document the characteristics of the base year 2002 network.

GEOGRAPHIC CODES FOR THE HIGHLANDS

The NJRTM highway network includes approximately 12,337 one-way links (excluding zonal connectors) in the thirteen county region. A one-way link is defined as a single direction connection between two related points, usually part of a series. Each link is assigned physical attributes such as number of lanes, average free flow speed, and general link capacities. Each link is also assigned a geographic code identifying the county of the location of that link. These county codes follow the Census Bureau's system in alphabetic order and uses only odd numbers such as 1 for Atlantic County and 3 for Bergen County. To identify whether a link is in the Highlands Region or not, the county codes on each link within the region were modified. For example, all links within Morris

County were assigned the county code of 27 in the original NJRTM. The county code was changed to 28 for all links from Morris County that were within the Highlands Region. Hence, the county code 27 represents links in Morris County outside of the region and code 28 represents links in Morris County within the region. This work was performed using a GIS layer provided by the Council that included the outer boundary of the Highlands Region. Figure 2 shows the NJRTM Model's highway network with the Highlands Boundary. Table 1 lists the original and modified county codes in the Highlands portion of the NJRTM highway network.

Table 1 - Modified County Codes in Highlands Portion of 2002 NJRTM Highway Network

COUNTY	COUNTY CODES	
	OUTSIDE HIGHLANDS	INSIDE HIGHLANDS
Bergen	3	4
Hunterdon	19	20
Morris	27	28
Passaic	31	32
Somerset	35	36
Sussex	37	38
Warren	41	42

Note: Table prepared for New Jersey Highlands Council

NETWORK QUALITY ASSURANCE CHECKS

A number of checks were performed on the NJRTM highway network to verify the link attributes within the Highlands Region. The primary attributes include facility type, area type, and number of lanes. These attributes are used in the modeling process to assign free-flow speeds and capacity to each link. Please refer to Appendix A for definitions of facility type and area type. Verification of the link attributes was conducted using the Cube graphical environment and by creating color maps. Facility type codes for all Freeways, Expressways, Principal Arterials, Major and Minor Arterials links were checked in and around the Highlands portion of the 2002 NJRTM network. No changes were made to the current facility type codes in the network. Area type codes for all links in the Highlands portion of the 2002 NJRTM network were also checked. The number of lanes for major facilities was checked against the NJDOT Straight-Line Diagrams. All interstate and state roads within the Highlands Region were checked for the number of lanes and found to be correct in the NJRTM Network. Finally, the shortest paths for major activity centers (approximately 20 origin-

destination pairs) were checked in order to verify the network connectivity and reasonability of distance and travel times on network links. Figure 3 depicts the NJRTM highway network in various colors representing freeways to collector roadways. Figure 4 depicts the area type codes on each link while Figure 5 shows the number of lanes in each direction of travel using the color scheme and link thickness.

NETWORK SUMMARY

Network characteristics in terms of number of lanes, total center-lane miles (roadway length) and total lane-miles (number of lanes*length) were evaluated. Tables 2, 3, and 4 list these summaries by county and facility type for all links within the Highlands. Similar statistics for the entire NJRTM model area are included in Tables 5, 6, and 7. There are 1,970 one-way links in the Highlands portion of the NJRTM highway network representing 1,186 miles of roadway and 3,304 lane-miles.

Table 2- Number of One-Way Links in Highlands Portion of 2002 NJRTM Highway Network

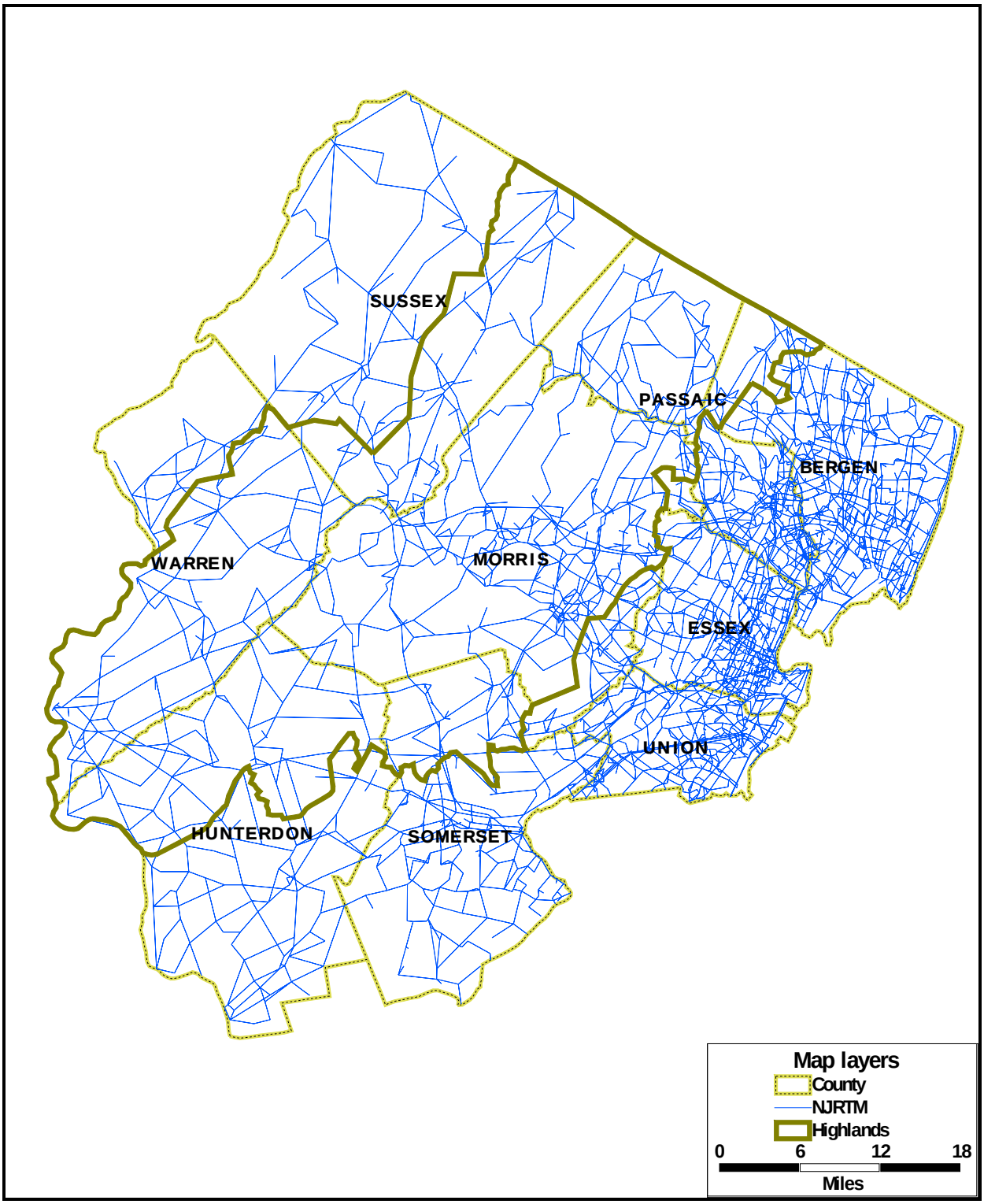
County	Facility Type						Total
	Freeway	Expressway	Principal Arterial	Major Arterial	Minor Arterial	Collector	
Bergen	12	6	16	10	48	0	92
Hunterdon	22	0	28	70	44	6	170
Morris	84	40	240	204	346	8	922
Passaic	10	0	18	74	96	0	198
Somerset	20	0	28	54	20	10	132
Sussex	2	8	64	52	60	0	186
Warren	32	0	92	54	92	0	270
Total	**182**	**54**	**486**	**518**	**706**	**24**	**1,970**

Note: Table prepared for New Jersey Highlands Council

Table 3- Total Center-Lane Miles in Highlands Portion-2002 NJRTM Highway Network

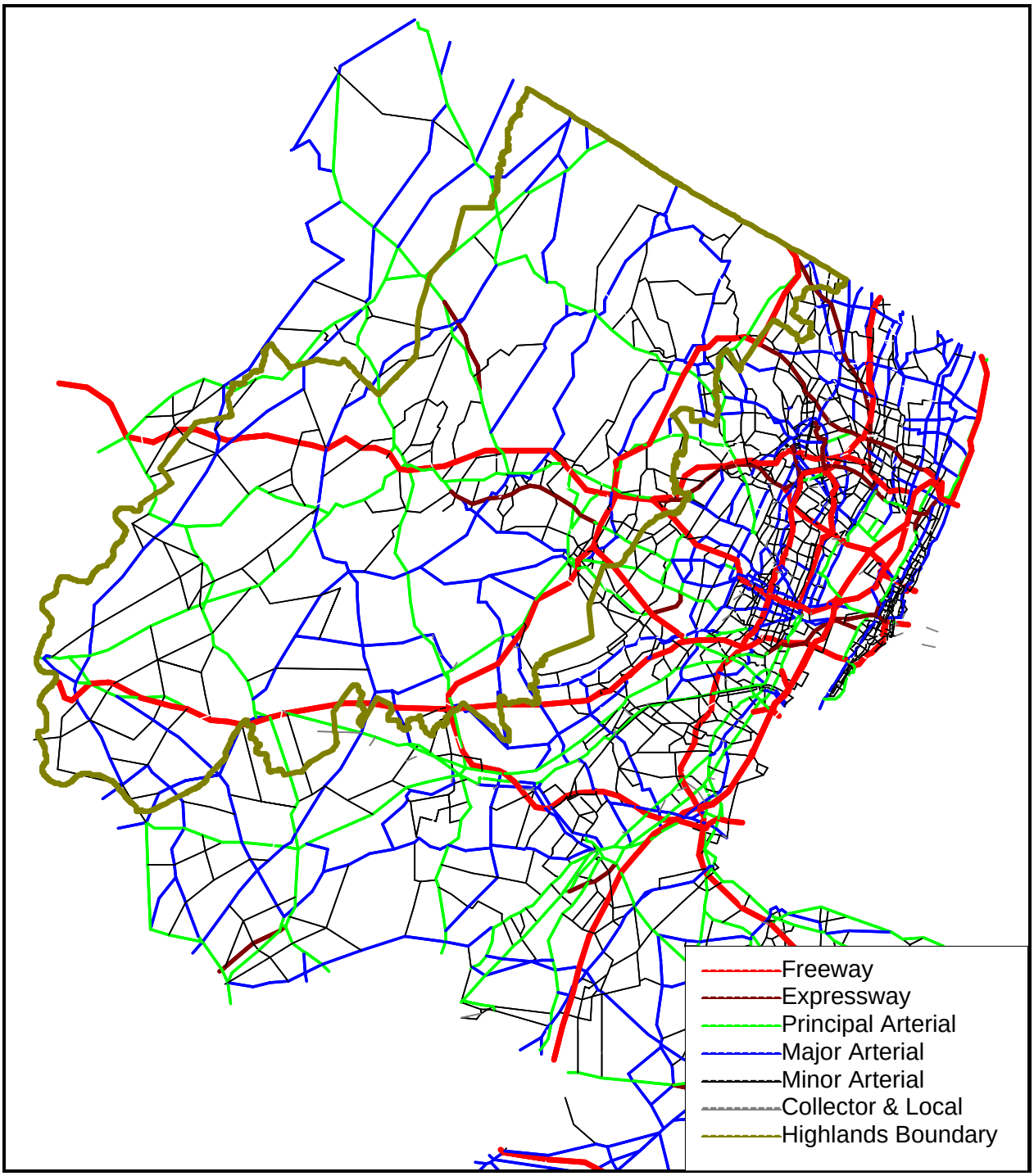
County	Facility Type						Total
	Freeway	Expressway	Principal Arterial	Major Arterial	Minor Arterial	Collector	
Bergen	10	3	8	6	21	0	48
Hunterdon	19	0	24	60	61	3	167
Morris	53	16	96	103	161	1	430
Passaic	4	0	9	34	52	0	99
Somerset	20	0	18	31	12	1	82
Sussex	1	5	47	45	40	0	138
Warren	20	0	57	43	102	0	222
Total	**127**	**24**	**259**	**322**	**449**	**5**	**1,186**

Note: Table prepared for New Jersey Highlands Council



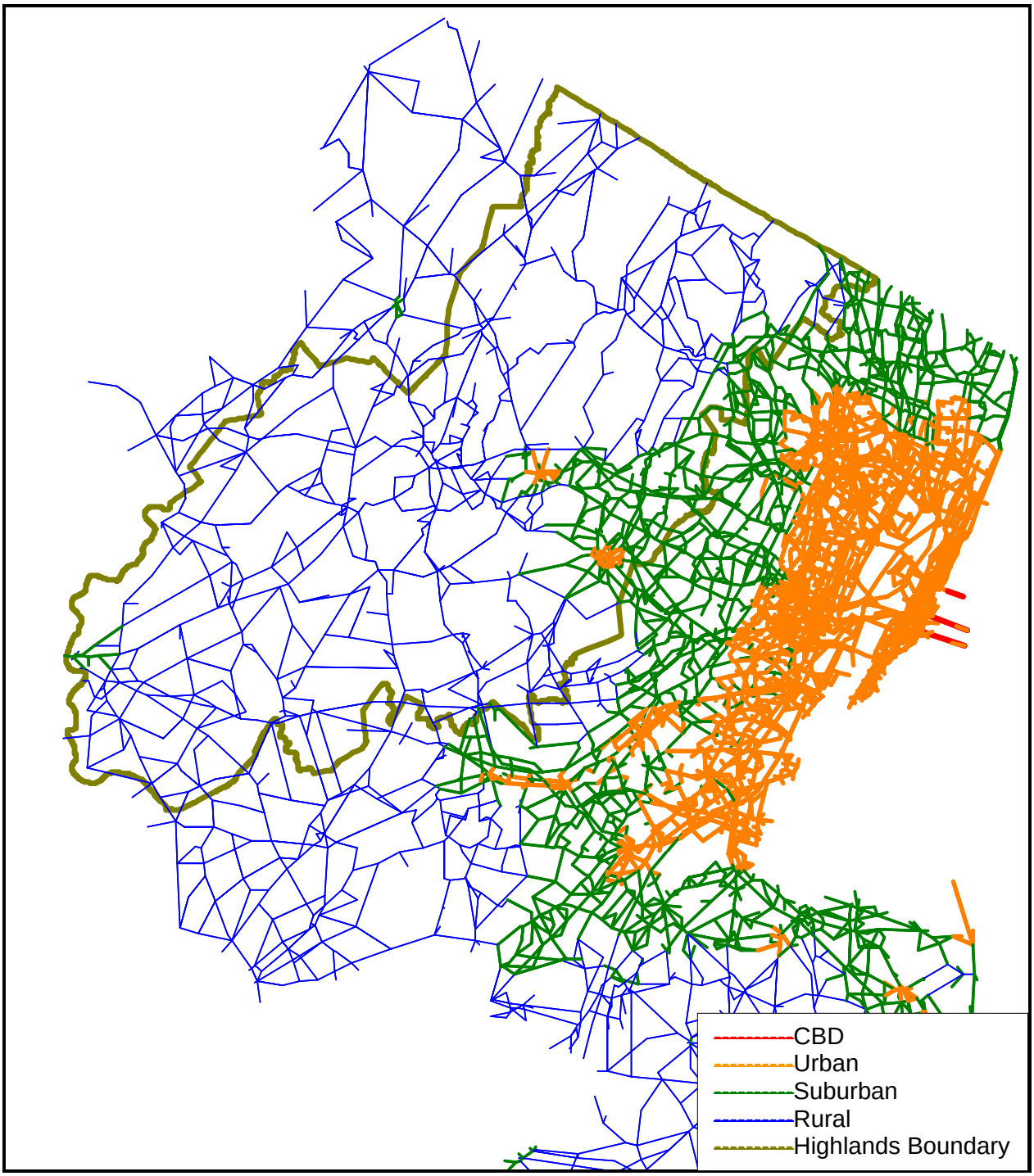
Note: Figure prepared for New Jersey Highlands Council

Figure 2 - 2002 NJRTM Highway Network



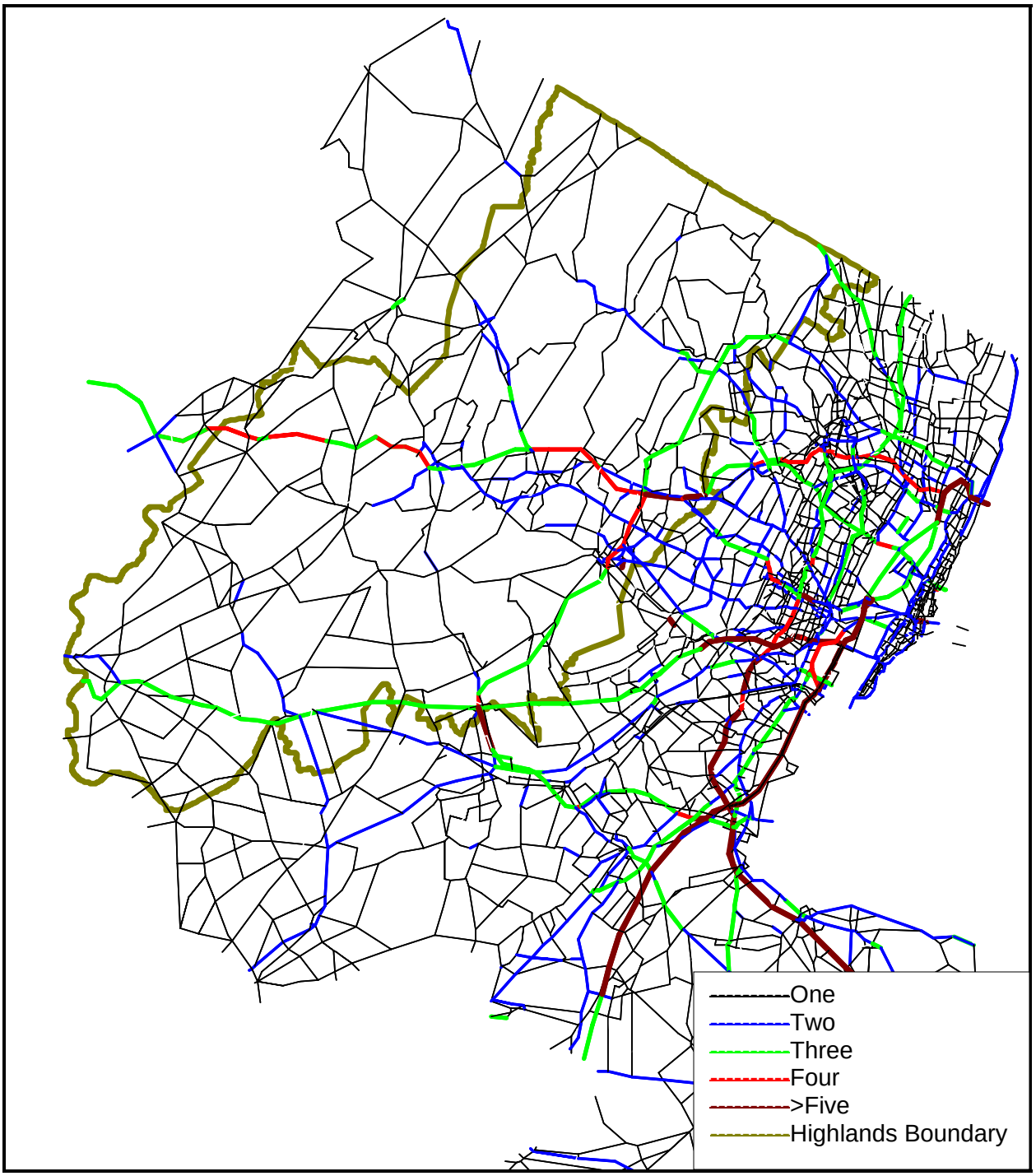
Note: Figure prepared for New Jersey Highlands Council

Figure 3 - 2002 NJRTM Highway Network-Facility Type



Note: Figure prepared for New Jersey Highlands Council

Figure 4 - 2002 NJRTM Highway Network-Area Type



Note: Figure prepared for New Jersey Highlands Council

Figure 5 - 2002 NJRTM Highway Network-Number of Lanes in Each Direction

Table 4- Total Lane-Miles in Highlands Portion of 2002 NJRTM Highway Network

County	Facility Type						Total
	Freeway	Expressway	Principal Arterial	Major Arterial	Minor Arterial	Collector	
Bergen	44	20	16	13	42	0	135
Hunterdon	112	0	84	120	121	6	443
Morris	359	62	303	214	430	2	1,370
Passaic	24	0	37	72	104	0	237
Somerset	136	0	37	62	25	2	262
Sussex	9	21	102	92	80	0	304
Warren	138	0	126	86	203	0	553
Total	**822**	**103**	**705**	**659**	**1,005**	**10**	**3,304**

Note: Table prepared for New Jersey Highlands Council

Table 5- Number of One-Way Links in 2002 NJRTM Highway Network

County	Facility Type						Total
	Freeway	Expressway	Principal Arterial	Major Arterial	Minor Arterial	Collector	
Bergen	178	114	110	529	808	30	1,769
Essex	154	48	120	401	710	44	1,477
Hudson	128	30	122	243	807	28	1,358
Hunterdon	22	10	110	156	114	8	420
Middlesex	178	10	314	230	414	29	1,175
Monmouth	119	10	309	254	302	26	1,020
Morris	86	40	262	216	458	8	1,070
Ocean	50	0	182	178	120	0	530
Passaic	106	98	56	294	674	14	1,242
Somerset	44	0	125	206	197	22	594
Sussex	2	8	116	108	92	0	326
Union	139	0	217	157	498	23	1,034
Warren	44	0	110	60	108	0	322
Total	**1,250**	**368**	**2,153**	**3,032**	**5,302**	**232**	**12,337**

Note: Table prepared for New Jersey Highlands Council

Table 6- Total Center-Lane Miles in 2002 NJRTM Highway Network

County	Facility Type						Total
	Freeway	Expressway	Principal Arterial	Major Arterial	Minor Arterial	Collector	
Bergen	69	41	41	169	227	3	550
Essex	45	14	29	98	163	5	354
Hudson	27	7	20	37	102	4	197
Hunterdon	19	6	83	131	136	3	378
Middlesex	73	4	127	99	184	5	492
Monmouth	68	6	156	168	161	3	562
Morris	57	16	105	109	207	1	495
Ocean	47	0	122	170	84	0	423
Passaic	27	16	19	79	169	1	311
Somerset	42	0	68	118	89	3	320
Sussex	1	5	94	117	66	0	283
Union	54	0	55	38	136	2	285
Warren	31	0	73	48	118	0	270
Total	**560**	**115**	**992**	**1,381**	**1,842**	**30**	**4,920**

Note: Table prepared for New Jersey Highlands Council

Table 7- Total Lane-Miles in 2002 NJRTM Highway Network

County	Facility Type						Total
	Freeway	Expressway	Principal Arterial	Major Arterial	Minor Arterial	Collector	
Bergen	377	206	121	372	472	6	1,554
Essex	305	63	117	281	360	10	1,136
Hudson	135	31	79	111	211	7	574
Hunterdon	112	23	239	262	272	7	915
Middlesex	561	24	507	210	380	10	1,692
Monmouth	410	24	498	349	328	5	1,614
Morris	377	62	331	225	530	2	1,527
Ocean	229	0	363	365	171	0	1,128
Passaic	171	75	80	180	358	3	867
Somerset	256	0	199	249	181	5	890
Sussex	9	21	211	237	132	0	610
Union	330	0	210	79	298	4	921
Warren	205	0	173	96	234	0	708
Total	**3,477**	**529**	**3,128**	**3,016**	**3,927**	**59**	**14,136**

Note: Table prepared for New Jersey Highlands Council

SOCIOECONOMIC DATA FOR THE BASE YEAR 2002

The socioeconomic data in the NJRTM includes the population, households, employment by type – basic (industrial), retail, and service, and average household income. This information is developed at the traffic analysis zone level for the entire NJRTM region at five-year increments between 2000 and 2030.

QUALITY ASSURANCE FOR DEMOGRAPHIC DATA

The base year 2002 socioeconomic data was developed by interpolating NJRTM data for the years 2000 and 2005. However, prior to interpolation, quality assurance checks were performed using the Census data. These checks were performed at the county level totals. Table 8 provides the county level comparison between Census 2000 numbers and the NJRTM 2000 data for population and households. As indicated in the Table 8, the total population and households for the 13-county NJRTM region are the same as the Census 2000– 6,310,989 population and 2,297,396 households. The difference in population of 1,328 between Census 2000 and NJRTM 2000 resulted from official Census 2000 counts based on the Census Count Question Resolution (CQR) program and incorporated into NJRTM 2000.

Table 8- County Level Comparison Between Census and NJRTM 2000 Data

COUNTY	2000					
	Population			Housing		
	Census	NJRTM	Difference	Census	NJRTM	Difference
Bergen	884,118	884,118	0	330,817	330,817	0
Essex	793,633	792,305	-1,328	283,736	283,736	0
Hudson	608,975	608,975	0	230,546	230,546	0
Hunterdon	121,989	121,989	0	43,678	43,678	0
Middlesex	750,162	750,162	0	265,815	265,815	0
Monmouth	615,301	615,301	0	224,236	224,236	0
Morris	470,212	470,212	0	169,711	169,711	0
Ocean	510,916	510,916	0	200,402	200,402	0
Passaic	489,049	490,377	1,328	163,856	163,856	0
Somerset	297,490	297,490	0	108,984	108,984	0
Sussex	144,166	144,166	0	50,831	50,831	0
Union	522,541	522,541	0	186,124	186,124	0
Warren	102,437	102,437	0	38,660	38,660	0
Total	**6,310,989**	**6,310,989**	**0**	**2,297,396**	**2,297,396**	**0**

Note: Table prepared for New Jersey Highlands Council

The Census 2002 estimates for population were obtained from the Census website. The interpolated 2002 data was compared with Census estimates. Table 9 provides this comparison indicating that Census estimates 25,000 more people than the interpolated value. This difference can be attributed to the linear relationship in interpolation between NJRTM 2000 and 2005 data. The interpolated 2002 NJRTM data, used for this analysis, was checked for each TAZ to ensure that the interpolated values for population, households, and employment were reasonable and between 2000 and 2005 numbers.

Table 9- County Level Comparison - Census Estimates and NJRTM 2002 Interpolated Data

COUNTY	2002 Population		
	Census Estimates	NJRTM Interpolated	Difference
Bergen	894,847	893,114	-1,733
Essex	796,435	795,801	-634
Hudson	609,626	618,760	9,134
Hunterdon	126,771	125,463	-1,308
Middlesex	770,069	764,328	-5,741
Monmouth	628,437	624,995	-3,442
Morris	478,800	476,301	-2,499
Ocean	537,433	527,932	-9,501
Passaic	497,068	495,965	-1,103
Somerset	307,918	304,834	-3,084
Sussex	148,874	147,709	-1,165
Union	529,536	527,066	-2,470
Warren	107,502	106,021	-1,481
Total	**6,433,316**	**6,408,289**	**-25,027**

Note: Table prepared for New Jersey Highlands Council

Socioeconomic Data for Traffic Analysis Zones within the Highlands

An equivalency was established between counties, municipalities, and zones within the Highlands Region based on the information from the NJRTM. Table 10 below lists the county, municipality and TAZ in that municipality for the entire Highlands Region. Please note that some of the smaller places (boroughs) are included in the TAZ's representing larger townships surrounding them. Based on this equivalency and TAZ level data, a county level summary of population, households and employment within the Highlands for the base year 2002 was developed. As listed in Table 11, there are 801,914 people living within the Highlands in 291,668 households. The total number of employment within the Highlands in the base year 2002 is estimated to be 401,606. Appendix B lists the population, households and employment by type at the TAZ level for the Highlands Region.

Table 10- County, Municipality, and TAZ Equivalency in Highlands Region

COUNTY	MUNICIPALITY	NJRTM ZONES
BERGEN		
	MAHWAH TWP	83-84
	OAKLAND BORO	99-101
HUNTERDON		
	ALEXANDRIA TWP	547
	BETHLEHEM TWP	545
	BLOOMSBURY BORO	**Combined with Bethlehem**
	CALIFON BORO	**Combined with Lebanon**
	CLINTON TOWN	550
	CLINTON TWP	552
	GLEN GARDNER BORO	544
	HAMPTON BORO	**Combined with Glen Gardner**
	HIGH BRIDGE BORO	551
	HOLLAND TWP	546
	LEBANON BORO	541
	LEBANON TWP	543
	MILFORD BORO	**Combined with Holland**
	TEWKSBURY TWP	542,562
	UNION TWP	548
MORRIS		
	BOONTON TOWN	900-901
	BOONTON TWP	899
	BUTLER BORO	892-893
	CHESTER BORO	968
	CHESTER TWP	969
	DENVILLE TWP	903-905
	DOVER TOWN	954-956
	HANOVER TWP	920-921
	HARDING TWP	946
	JEFFERSON TWP	952-953
	KINNELON BORO	894-895
	MENDHAM BORO	966
	MENDHAM TWP	967
	MINE HILL TWP	958
	MONTVILLE TWP	896-898
	MORRIS PLAINS BORO	922-924
	MORRIS TWP	933-937
	MORRISTOWN TOWN	938-941
	MOUNT ARLINGTON BORO	960
	MOUNT OLIVE TWP	971-972
	MOUNTAIN LAKES BORO	902
	NETCONG BORO	970
	PARSIPPANY-TROY HILLS TWP	906-916

COUNTY	MUNICIPALITY	NJRTM ZONES
	PEQUANNOCK TWP	889-890
	RANDOLPH TWP	964-965
	RIVERDALE BORO	891
	ROCKAWAY BORO	947
	ROCKAWAY TWP	948-951
	ROXBURY TWP	959,961-962
	VICTORY GARDENS BORO	963
	WASHINGTON TWP	973-974
	WHARTON BORO	957
PASSAIC		
	BLOOMINGDALE BORO	1063
	POMPTON LAKES BORO	1127
	RINGWOOD BORO	1129
	WANAQUE BORO	1132
	WEST MILFORD TWP	1144-1148
SOMERSET		
	BEDMINSTER TWP	1185
	BERNARDS TWP	1178-1181
	BERNARDSVILLE BORO	1182
	FAR HILLS BORO	1184
	PEAPACK GLADSTONE BORO	1183
SUSSEX		
	BYRAM TWP	1231,1237-1238
	FRANKLIN BORO	1242-1243
	GREEN TWP	1227
	HAMBURG BORO	1241
	HARDYSTON TWP	1240, 1244
	HOPATCONG BORO	1232-1239
	OGDENSBURG BORO	1249
	SPARTA TWP	1245-1248
	STANHOPE BORO	1233
	VERNON TWP	1209-1210, 1213, 1215-1216
WARREN		
	ALLAMUCHY TWP	1363
	ALPHA BORO	1377
	BELVIDERE TOWN	1369
	FRANKLIN TWP	1373
	FRELINGHUYSEN TWP	1360
	GREENWICH TWP	1374
	HACKETTSTOWN TOWN	1364-1365
	HARMONY TWP	1370
	HOPE TWP	1361
	INDEPENDENCE TWP	1362
	LIBERTY TWP	**Combined with Hope**
	LOPATCONG TWP	1375

COUNTY	MUNICIPALITY	NJRTM ZONES
	MANSFIELD TWP	1366
	OXFORD TWP	1368
	PHILLIPSBURG TOWN	1355-1358
	POHATCONG TWP	1376
	WASHINGTON BORO	1372
	WASHINGTON TWP	1371
	WHITE TWP	1367

Note: Table prepared for New Jersey Highlands Council

Table 11: Socioeconomic Data Within Highlands Portion- 2002 NJRTM Highway Network

County	Population	Household	Employment			
			Basic	Retail	Service	Total
Bergen	37,263	13,909	10,577	3,325	10,265	24,167
Hunterdon	59,662	20,268	7,149	3,609	14,890	25,648
Morris	399,449	145,007	78,388	35,694	137,061	251,143
Passaic	68,961	24,364	4,061	2,166	10,995	17,222
Somerset	44808	17845	9858	3249	14214	27,321
Sussex	93,104	32,825	5,133	3,277	13,373	21,783
Warren	98,667	37,450	11,889	6,968	15,465	34,322
Total	**801,914**	**291,668**	**127,055**	**58,288**	**216,263**	**401,606**

Note: Table prepared for New Jersey Highlands Council

MODEL VALIDATION

This chapter discusses the model validation for base year 2002 in the Highlands Region. It provides a summary of various checks that were performed prior to considering the model validated. Model validation is an iterative process of achieving a "reasonable" agreement between the observed and estimated travel data. The typicald comparison is between highway traffic assignments and actual traffic volumes derived from traffic count data. This process builds confidence in the model's output and its ability to predict future traffic. Please note that validation was performed for the entire model used as a base for the Highlands Region model.

Traffic Counts

Traffic counts were obtained from various sources for the validation process. Available traffic counts on major roads were obtained from NJDOT and coded them on the highway network using mileposts and other location descriptions. Traffic count data for the Highlands Region is limited and will continue to be evaluated for future model developments. Traffic counts for county and local roads were obtained from the county planning and engineering departments for Hunterdon,

Warren, and Morris Counties. Traffic counts were compiled in and around the Highlands Region of the model. Quality assurance checks were performed on the posted counts to verify the correct location and magnitude of the counts. All traffic counts were daily counts and not peak period specific. A total of 586 one-way links have counts posted in the Highlands model.

The counts were then adjusted for base year 2002 using a growth factor that was calculated for the region based on counts at permanent count stations for the last five years. The average annual growth factor was calculated to be approximately 1.95 percent, as shown in Table 12.

VALIDATION ANALYSIS

Since the majority of the traffic counts were available on an Average Daily Traffic (ADT) basis, the focus of the model validation was primarily on the daily traffic assignments. The daily traffic volumes were calculated by adding three time periods—AM Peak (6:30-8:30 AM), PM Peak (3:30-6:00 PM), and Off-Peak (remaining 19.5 hours)—highway assignments were compared with daily traffic counts.

Network Changes

Minor changes were made in the network and speed lookup table to improve the highway assignment accuracy, including:

- Adjustment to zonal connectors to improve the highway assignment results for minor arterials and collectors. These changes were made with the help of existing street layers as a reference.
- Initial free-flow reference speed for principal arterials (divided) in suburban areas were reduced to 46 mph from 49 mph since the model assignment was significantly higher than observed traffic counts for this roadway category.

Table 12- Traffic Growth Between 2000 and 2004 Around the Highlands

#	Station	Route	Location	County	2000	2004	Diff.	Annual Rate
1	1-2-10	I-78	I 78 Bridge Toll	Warren	42,200	50,400	8,200	4.54%
2	1-1-33	I-80	Under Fox Hill Rd Underpass	Morris	134,900	148,400	13,500	2.41%
3	1-1-36	I-80	Just East of Franklin Rd Underpass	Morris	130,700	131,500	800	0.15%
4	1-1-32	I-80	Under Mt Hope Ave (Co 661)	Morris	133,200	138,100	4,900	0.91%
5	1-1-25	I-80	Co 685 & Union Brick Rd	Warren	42,700	53,000	10,300	5.55%
6	1-2-17	I-80	Delaware Water Gap Bridge, Toll	Warren	49,700	54,800	5,100	2.47%
7	3-3-21	I-280	Bet. Beaver Avenue & New Road	Morris	72,500	75,600	3,100	1.05%
8	1-1-21	I 287	Glen Alpin Rd Co 646 Overpass	Morris	78,500	99,300	20,800	6.05%
9	1-1-34	US 46	Bet. Dixon Dr & Lackawanna Ave	Morris	30,100	29,500	-600	-0.50%
10	1-1-39	US 46	Bet. NJ 31 & RT 519	Warren	10,500	10,300	-200	-0.48%
11	1-1-35	US 206	Bet. Co 612 & Co 613	Morris	21,500	20,800	-700	-0.82%
12	1-1-38	NJ 15	Bet. Parker Rd & Philips Rd	Morris	57,000	57,700	700	0.31%
13	2-1-05	NJ 23	Bet. River Dr & Boulevard	Morris	67,200	71,200	4,000	1.46%
14	1-1-23	CO 611	Hope Rd	Warren	3,000	3,300	300	2.41%
Total					**873,700**	**943,900**	**70,200**	**1.95%**

Note: table prepared for New Jersey Highlands Council

Estimated vs. Observed Volumes by Facility Type and Area Type

This analysis compares model-estimated volumes and observed traffic by facility type and area type for links where counts are available. The Federal Highway Administration (FHWA) suggests that overall region-wide model estimates should be within 5 percent of the observed traffic. Table 13 provides the FHWA suggested targets for various facility types. Table 14 depicts the ratios of model estimates and observed traffic by area type and facility type. The overall model estimated volumes are matched closely to the observed traffic (ratio of 0.99). When compared on an area type basis, the estimated volumes are within 3 percent of the observed values indicating that the model is producing reasonable estimates across all area types.

Table 13- FHWA Facility Type Validation Targets

Facility Type	FHWA Targets
Freeway	+/- 7%
Major Arterial	10%
Minor Arterial	15%
Collector	25%

Note: Table prepared for New Jersey Highlands Council
Source: FHWA, Calibration and Adjustments of System Planning Models, Dec 1990

The volume/count ratio by facility type shows more variations but within acceptable ranges, except the expressway and minor arterial categories. As listed in Table 15, there are only 22 observations in the category. It should be noted that larger variations in lower type facilities are expected in regional models, which are mainly related to larger traffic analysis zones and lack data to support the model validation process. It is anticipated that during the next Phase, traffic assignments on minor arterials will improve.

Table 14- Observed vs. Estimated Volumes by Facility Type and Area Type in Highlands Region

Facility Type	Area Type			
	Urban	Suburban	Rural	Total
Freeway	1.15	0.97	0.89	**0.95**
Expressway	-	1.11	1.28	**1.15**
Principal Arterial	0.48	1.17	1.03	**1.06**
Major Arterial	1.35	0.94	1.04	**1.03**
Minor Arterial	0.76	0.58	0.89	**0.75**
Total	**1.00**	**1.01**	**0.97**	**0.99**

Note: Table prepared for New Jersey Highlands Council

Table 15- Number of One-Way Links with Counts in Highlands Region

Facility Type	Area Type			
	Urban	Suburban	Rural	Total
Freeway	6	54	46	**106**
Expressway	0	14	8	**22**
Principal Arterial	6	56	132	**194**
Major Arterial	4	16	122	**142**
Minor Arterial	2	28	92	**122**
Total	**18**	**168**	**400**	**586**

Note: Table prepared for New Jersey Highlands Council

Estimated vs. Observed Volumes by County

Table 16 lists volume-to-count ratio for counties within Highlands. It should be noted again that traffic counts were posted only around the Highlands Region and hence only portions of the counties are represented in the table. The counties with a lower number of traffic counts in the network such as Bergen and Somerset Counties have a larger variation in volume-to-count ratio compared to counties where more observations were available.

Table 16- Estimated vs. Observed Traffic by County and Facility Type

County	# of Observations	Observed	Estimated	Ratio
Bergen	6	169,482	140,891	**0.83**
Hunterdon	68	468,378	424,827	**0.91**
Morris	222	3,888,126	3,939,114	**1.01**
Passaic	16	265,646	268,772	**1.01**
Somerset	10	476,224	324,902	**0.68**
Sussex	20	189,122	231,954	**1.23**
Warren	96	559,700	495,158	**0.88**
Total	**438**	**6,016,678**	**5,825,618**	**0.97**

Note: table prepared for New Jersey Highlands Council

Estimated vs. Observed Volumes by Volume Range

This check compares the estimated and observed traffic by volume ranges. It is expected that lower volume roads will have a larger deviation than higher volume roads. Table 17 provides targets for volume range based on FHWA and Michigan Department of Transportation (MDOT) standards. Table 18 provides comparisons between observed and estimated traffic. As shown in the table, the Highlands Transportation Model is within acceptable ranges for both FHWA and MDOT targets.

Table 17- Volume Range Validation Criteria

AADT	Desirable Percent Deviation	
	MDOT	FHWA
< 1,000	200%	60%
1,001 to 2,500	100%	47%
2,501 to 5,000	50%	36%
5,001 to 10,000	25%	29%
10,001 to 25,000	20%	25%
25,001 to 50,000	15%	22%
> 50,000	10%	21%

Source: Table 7-8, P. 101, Model validation and Reasonableness Checking Manual, Travel Model Improvement Program, February 1997. Note: Table prepared for NJHC

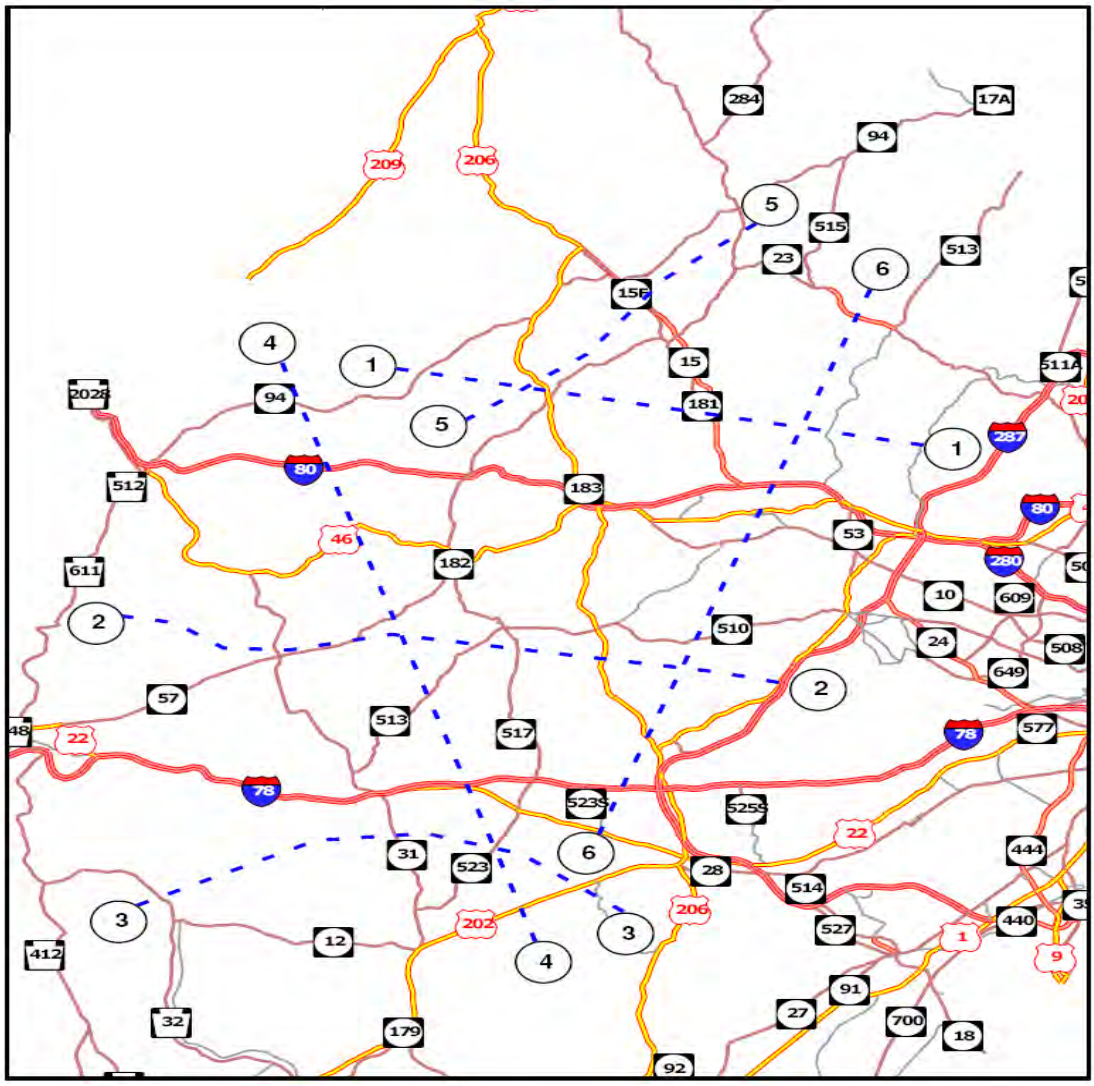
Table 18- Observed vs. Estimated Volume by Volume Ranges

Range	# of Observations	Observed	Estimated	Difference	Percent Deviation
< 1,000	46	27,138	37,952	10,814	40%
1,001 to 2,500	96	165,524	149,602	-15,922	10%
2,501 to 5,000	92	334,270	301,013	-33,257	10%
5,001 to 10,000	118	813,770	819,014	5,244	1%
10,001 to 25,000	111	1,749,060	1,935,084	186,024	11%
25,001 to 50,000	93	3,403,396	3,281,396	-122,000	4%
> 50,000	30	1,808,236	1,710,156	-98,080	5%

Note: Table prepared for New Jersey Highlands Council

Screenline Analysis

The screenline is an imaginary line generally placed along a major roadway or topographical feature (such as a river or railway) designed to intercept major traffic movements. Screenlines determine the major system-wide movement of trips between various areas of the model. Six screenlines were developed as depicted in Figure 6 below. Table 19 provides the suggested targets for the screenline analysis based on the total traffic crossing each screenline. Table 20 lists the daily highway assignment and traffic counts for screenlines in the Highland Model. The estimated daily vehicle volumes are within 5 percent of the actual daily vehicle counts for all the screenlines.



Note: Figure prepared for New Jersey Highlands Council

Figure 6 - Screenlines in Highlands Travel Model

Table 19- Validation Targets for Screenlines

Total Screenline 24-Hour Traffic Count	Percent Deviation
25,000	+/- 43%
50,000	33%
75,000	29%
100,000	25%
125,000	21%
150,000	20%
175,000	19%
200,000	18%

Note: Table prepared for New Jersey Highlands Council

Table 20- Estimated and Observed Traffic at Screenlines

Screenline	Observed	Estimated	Ratio	Percent Deviation
1	199,812	191,758	0.96	4.20%
2	179,000	170,369	0.95	5.07%
3	94,316	98,707	1.05	4.45%
4	231,760	226,759	0.98	2.21%
5	63,698	67,136	1.05	5.12%
6	435,944	414,397	0.95	5.20%

Note: Table prepared for New Jersey Highlands Council

TRIP DISTRIBUTION SUMMARY

The trip distribution patterns were analyzed in the base 2002 model and summarized the final daily vehicle trip table into major groupings. This identified the major origins and destinations of trips generated in the Highlands area. The TAZ's were grouped into seven districts as following:

- Highlands Region
- Western Externals going to PA
- Sussex and Warren County portions not included in the Highlands
- Northern New Jersey East of Highlands (Bergen, Essex, Hudson, Union, etc.)
- Central and South Jersey (Middlesex, Hunterdon, Monmouth, Southern externals, etc.)
- Externals going to Manhattan, NY
- Externals going to Rockland and Orange Counties, NY

The comparison of the trip interactions from/to Highlands are presented in Table 21. Table 22 shows the summary of travel patterns from the 2002 highway trip table at the district levels mentioned above. Figure 7 shows the trip distribution summary in a graphical form. The main observations found in Table 21 are as follows:

- 72 percent of trips originate and end within the Highlands region,
- 16 percent to/from Northern New Jersey
- 4 percent to/from Central and South Jersey
- 3 percent to/from Western externals to PA
- 1 percent to/from Manhattan, NY

Table 21- Trip Distribution Summary to/from Highlands

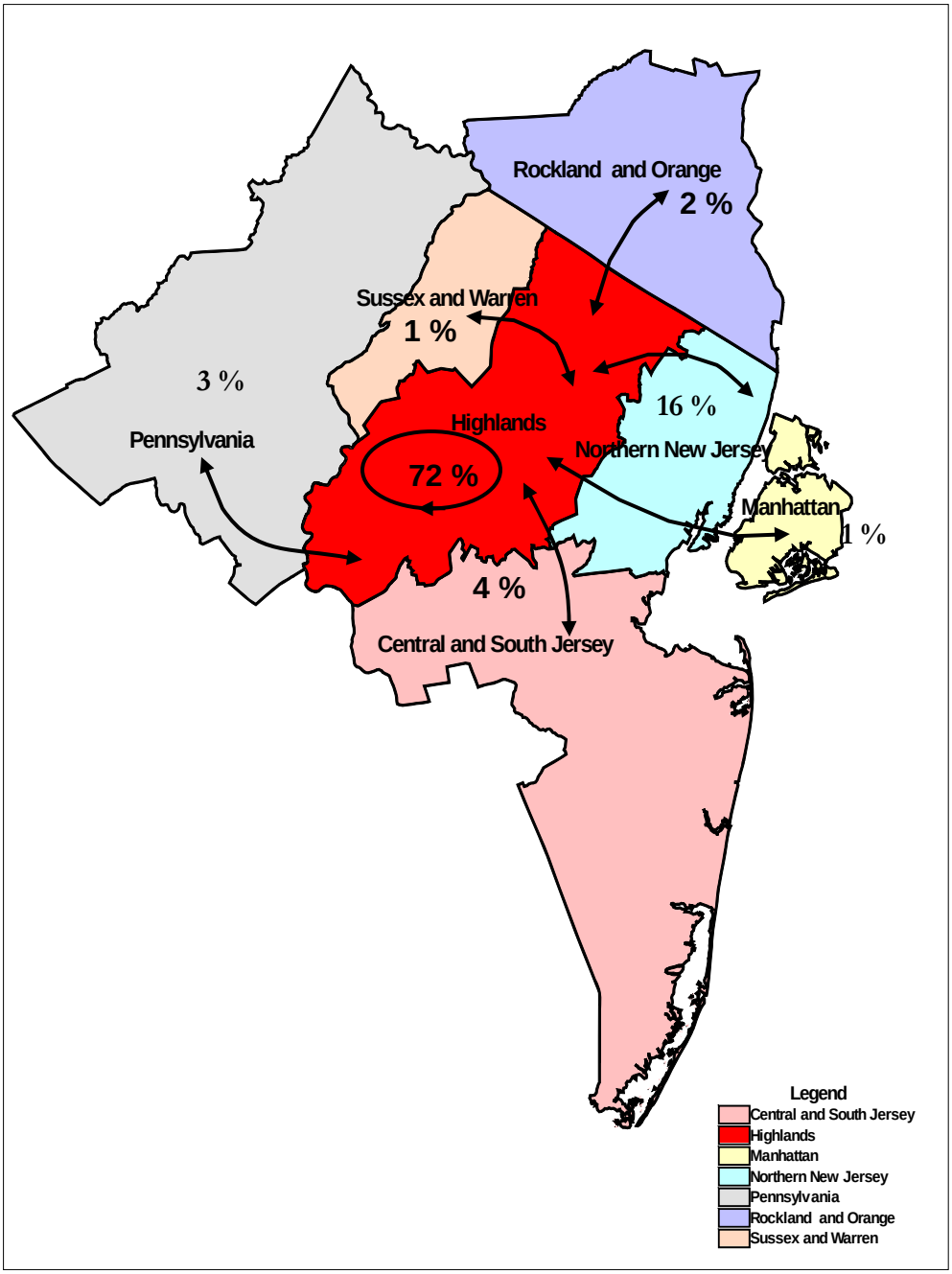
District		Origins		Destination	
		Trips	Percent	Destination	Trips %
Highlands	1	1,328,616	72%	1,328,616	73%
Pennsylvania	2	59,130	3%	60,657	3%
Sussex and Warren	3	21,802	1%	24,725	1%
Northern NJ	4	300,263	16%	278,847	15%
Central & South NJ	5	82,060	4%	78,797	4%
Manhattan & East	6	13,308	1%	13,056	1%
Rockland and Orange	7	27,582	2%	27,407	2%
Total		1,832,761	100%	1,812,105	100%

Note: table prepared for New Jersey Highlands Council

Table 22- Highlands Model-2002 Total Daily Vehicle Trips

District		Highlands	Pennsylvania	Sussex and Warren	Northern NJ	Central & South NJ	Manhattan & East	Rockland and Orange	Total
		1	2	3	4	5	6	7	**Total**
Highlands	1	1,328,616	59,130	21,802	300,263	82,060	13,308	27,582	**1,832,762**
Pennsylvania	2	60,657	4	5,672	19,008	58,479	6,989	1,473	**152,284**
Sussex and Warren	3	24,725	5,910	113,967	7,374	1,606	593	2,807	**156,985**
Northern NJ	4	278,847	17,734	5,231	5,326,325	288,945	173,787	115,400	**6,206,273**
Central & South NJ	5	78,797	58,286	1,301	310,913	5,026,066	31,041	7,135	**5,513,544**
Manhattan & East	6	13,056	7,264	583	173,195	32,038	0	10,165	**236,307**
Rockland and Orange	7	27,407	1,479	2,715	116,869	7,078	9,819	0	**165,374**
Total		**1,812,105**	**149,807**	**151,271**	**6,253,947**	**5,496,272**	**235,537**	**164,562**	**14,263,529**

Note: Table prepared for New Jersey Highlands Council



Note: Figure prepared for New Jersey Highlands Council

Figure 7 – Vehicle Trip Distribution Summary to/from Highlands

NETWORK PERFORMANCE SUMMARY

The results of the highway assignment were analyzed to develop a summary of various highway network performance measures for the base year 2002. Vehicle miles traveled (VMT), vehicle hours traveled (VHT), and average speed were calculated using the highway assignment. This section also provides a summary of average trip length by trip purpose. Finally, color-coded maps were developed based on volume capacity ratios for AM and PM peak periods. The AM peak period is the 2-hour period between 6:30 and 8:30 AM, while the PM peak period is the 2.5 hours between 3:30 and 6:00 PM. The following sections provide a summary of each of the performance measures.

VEHICLE MILES TRAVELED (VMT)

The vehicle-miles traveled were summarized on a time period basis and grouped by facility type. As listed in Table 23, the VMT for the Highlands Region higher-level roadways is 19.77 million miles on an average weekday. Table 24 lists the roadway miles by facility type in the Highlands Region. The AM and PM peak periods together contribute approximately 40 percent of the daily VMT although the peak periods constitute only 5.2.5 hours of the 24 hours. The VMT breakdown based on facility type indicate that freeways contribute about 47 percent of the higher-level roadway VMT although freeways represent only 11 percent of the total roadway miles in the Highlands Region. All arterials combined contribute about 47 percent of the higher-level roadway VMT, although arterials represent 87 percent of the total roadway miles in the Highlands Region. Figure 8 represents the VMT distribution by facility type.

Table 23- VMT Distribution by Facility Type and Time Period

Facility Type	AM	PM	Off-Peak	Daily	Daily Proportion
Freeway	1,633,624	1,912,005	5,671,078	9,216,707	47%
Expressway	243,791	258,564	796,082	1,298,437	7%
Principal Arterial	932,346	1,118,323	3,206,525	5,257,194	27%
Major Arterial	475,896	547,571	1,596,507	2,619,974	13%
Minor Arterial	293,880	305,753	781,992	1,381,625	7%
Total	**3,579,537**	**4,142,216**	**12,052,184**	**19,773,937**	**100%**
Proportion	**18%**	**21%**	**61%**	**100%**	

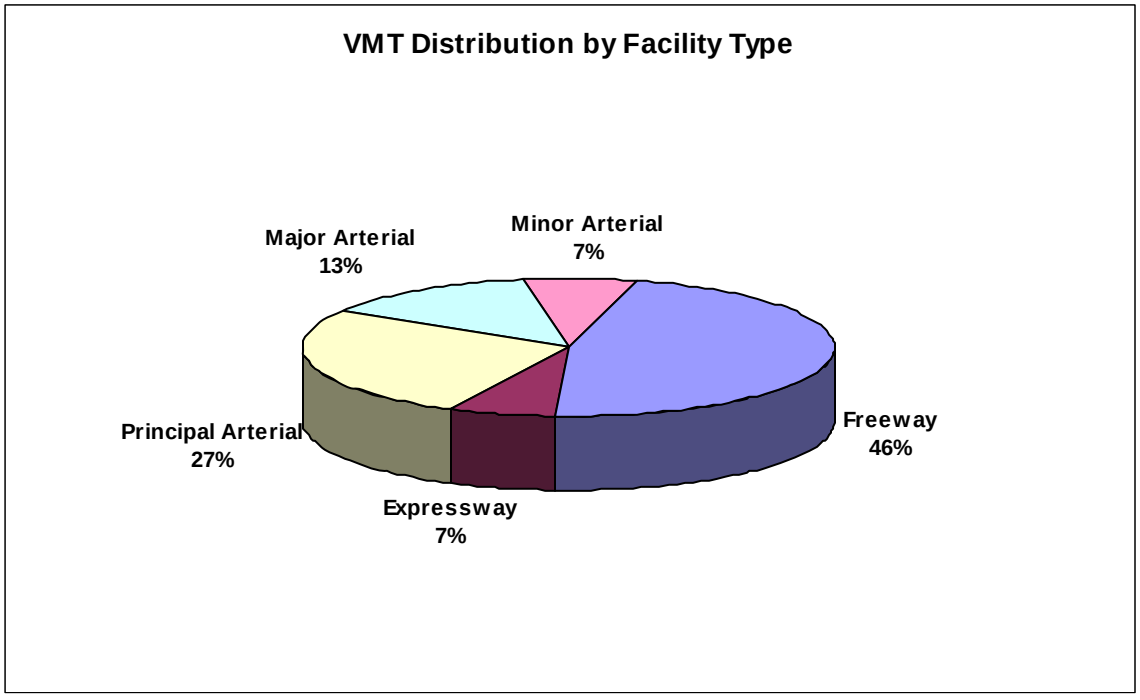
Note: Table prepared for New Jersey Highlands Council

Table 24: Roadway Miles in Highlands Region by Facility Type

Facility Type	Roadway Miles	Proportion
Freeway	127	10.7%
Expressway	24	2.0%
Principal Arterial	259	21.8%
Major Arterial	322	27.2%
Minor Arterial	449	37.9%
Collector	5	0.4%
Total	1186	100%

Note: Table prepared for New Jersey Highlands Council

Figure 8 - VMT Distribution on Daily basis by Facility Type



Note: Figure prepared for New Jersey Highlands Council

VEHICLE HOURS TRAVELED (VHT)

As listed in Table 25, the VHT for the Highlands Region is 504,420 hours on a daily basis for an average weekday. AM and PM peak periods together contribute about 44 percent of the total VHT in the Highlands Region. The breakdown based on facility type indicates that freeways contribute about one-third (33.5 percent) of the total VHT. All arterials combined contribute about 61 percent of the total VHT of which principal arterials generate about 30 percent. Figure 9 represents the VHT distribution by facility type on a daily basis.

Table 25- VHT Distribution by Facility Type and Time Period

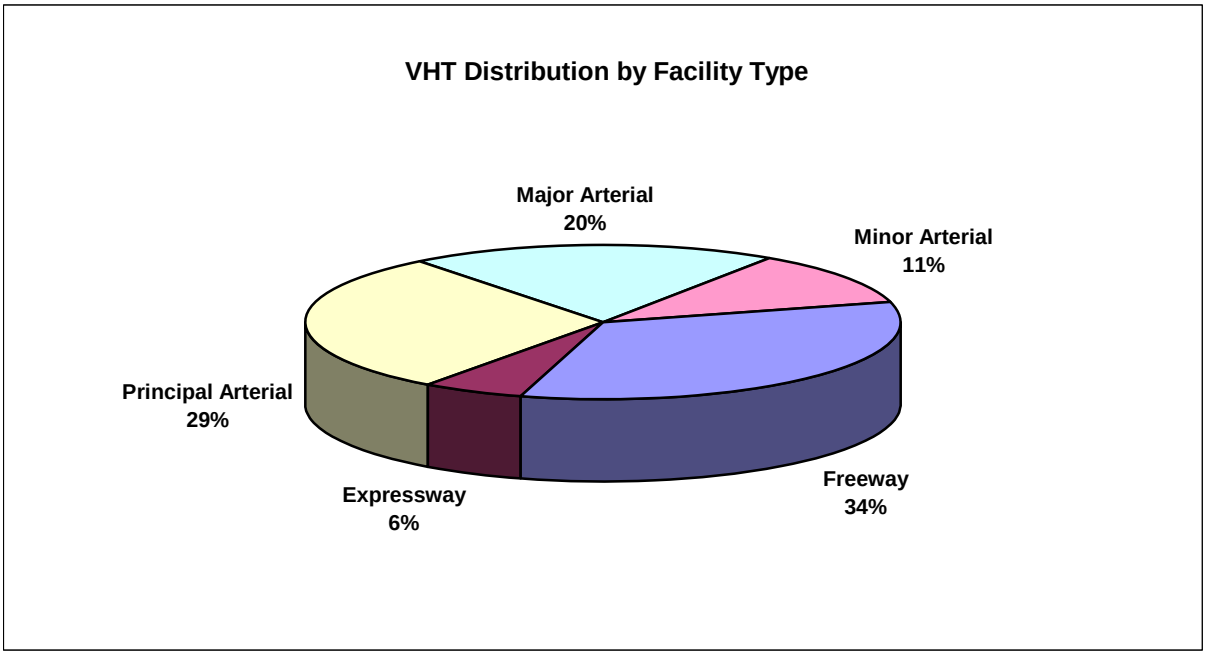
Facility Type	AM	PM	Off-Peak	Daily	Daily Proportion
Freeway	33,265	38,854	96,864	168,983	34%
Expressway	6,051	6,417	15,946	28,414	6%
Principal Arterial	31,045	37,088	80,570	148,703	29%
Major Arterial	19,601	22,577	59,184	101,362	20%
Minor Arterial	12,740	13,257	30,961	56,958	11%
Total	**102,702**	**118,193**	**283,525**	**504,420**	**100%**
Proportion	**20%**	**23%**	**56%**	**100%**	

Note: table prepared for New Jersey Highlands Council

AVERAGE SPEED

Average speed is calculated by dividing the total vehicle miles traveled with the total vehicle hours traveled for each facility type. Table 26 summarizes the average speeds by facility type and time period. The average speeds for AM and PM peak periods are almost the same indicating similar congestion on roadways in both time periods. The off-peak speeds are higher than the peak speeds for all facility types, which indicate lower levels of congestion. The off-peak speeds for freeways, expressways, and principal arterials are about 10 mph higher than the peak speeds. The overall average speed for the Highlands Region is about 39 mph.

Figure 9 - VHT Distribution by Facility Type



Note: Figure prepared for New Jersey Highlands Council

Table 26- Average Speed by Facility Type and Time Period

Facility Type	AM	PM	OP	Daily
Freeway	49.1	49.2	58.5	54.5
Expressway	40.3	40.3	49.9	45.7
Principal Arterial	30.0	30.2	39.8	35.4
Major Arterial	24.3	24.3	27.0	25.8
Minor Arterial	23.1	23.1	25.3	24.3
Total	**34.9**	**35.0**	**42.5**	**39.2**

Note: Table prepared for New Jersey Highlands Council

DAILY VMT, VHT, AND AVERAGE SPEED BY COUNTY

VMT, VHT, and average speed were summarized by county in the Highlands Region as shown in Table 27. Table 28 lists the center-lane miles by county in the Highlands Region. Morris County has the highest VMT of about 10 million miles and VHT of about 261,000 hours, which is more than 50 percent of the total VMT and VHT generated in the Highlands Region, while Morris County represents about 36 percent of the total roadway miles. Somerset County has the highest average speed of 44.72 mph. Passaic County has the lowest average speed of 33.25 mph, which constitutes about 8 percent of the total roadway miles. The lower average speed could be attributed to the fact that only a portion of Passaic County is part of the Highlands Region and the roadways consists mainly of minor arterials.

Table 27- VMT, VHT, and Average Speed by County on Average Weekday

County	VMT	VHT	Average Speed
Bergen	1,041,754	26,511	39.30
Hunterdon	2,109,725	48,799	43.23
Morris	10,154,815	261,128	38.89
Passaic	1,114,787	33,523	33.25
Somerset	1,888,473	42,226	44.72
Sussex	1,403,961	40,478	34.68
Warren	2,060,422	51,755	39.81
Total	19,773,937	504,420	39.20

Note: Table prepared for New Jersey Highlands Council

Table 28- Roadway Miles in Highlands Region by County

County	Roadway Miles	Proportion
Bergen	48	4.0%
Hunterdon	167	14.1%
Morris	430	36.3%
Passaic	99	8.3%
Somerset	82	6.9%
Sussex	138	11.6%
Warren	222	18.7%
Total	**1186**	**100%**

Note: Table prepared for New Jersey Highlands Council

AVERAGE TRIP LENGTH

The average trip length was estimated for each trip purpose using the trip tables on a daily basis. These calculations were performed for each county included in the Highlands Region and the results are shown in Tables 29 and 30 Table 29 shows the average trip length by distance in miles and Table 30 represents the average trip length by time in minutes. The average trip length estimated for home-based work (HBW) is greater than other purposes throughout the region. Trips that are home-based, originate at home so that a home-based work (HBW) trip would begin at home and end at work. Warren County has the highest average trip length, measured in miles, for home-based work followed closely by Hunterdon and Sussex Counties. Sussex County has the highest average trip length, measured in minutes, for home-based shopping (HBSH) and home-based other (HBO) purposes. Hunterdon County has the highest average trip length, measured in minutes, for non-home based (NHB) purposes. Bergen County has the lowest trip lengths for all purposes. This could be attributed to the fact that only a small portion of the entire Bergen County is part of the Highlands Model. The average trip length for the Highlands Model is greater than the NJRTM Model for all four purposes. This is because rural areas of Hunterdon, Sussex, and Warren do not have high land use densities and the roadway network is sparse compared to other counties, requiring longer distance travel for work and other purposes.

Table 29- Average Trip Length – Distance in Miles

County	Purpose			
	HBW	HBSH	HBO	NHB
Bergen	16.03	7.89	9.12	11.42
Hunterdon	22.73	12.42	12.38	18.52
Morris	18.28	8.16	9.59	12.65
Passaic	19.69	13.96	12.32	15.51
Somerset	19.95	10.18	11.61	16.37
Sussex	22.44	14.58	13.24	16.39
Warren	22.83	9.69	10.15	16.32
Highlands Region	19.38	9.74	10.41	13.54
NJRTM	12.88	5.73	6.22	8.82

Note: Table prepared for New Jersey Highlands Council

Table 30- Average Trip Length -Time in Minutes

County	Purpose			
	HBW	HBSH	HBO	NHB
Bergen	27.38	14.03	15.85	18.31
Hunterdon	35.64	20.40	20.24	27.26
Morris	30.54	14.13	15.99	19.30
Passaic	36.74	23.34	21.44	25.06
Somerset	31.90	16.68	19.10	24.75
Sussex	40.34	23.47	21.44	25.26
Warren	35.84	16.66	17.08	24.70
Highlands Region	32.41	16.47	17.35	20.71
NJRTM	23.97	11.30	11.94	15.21

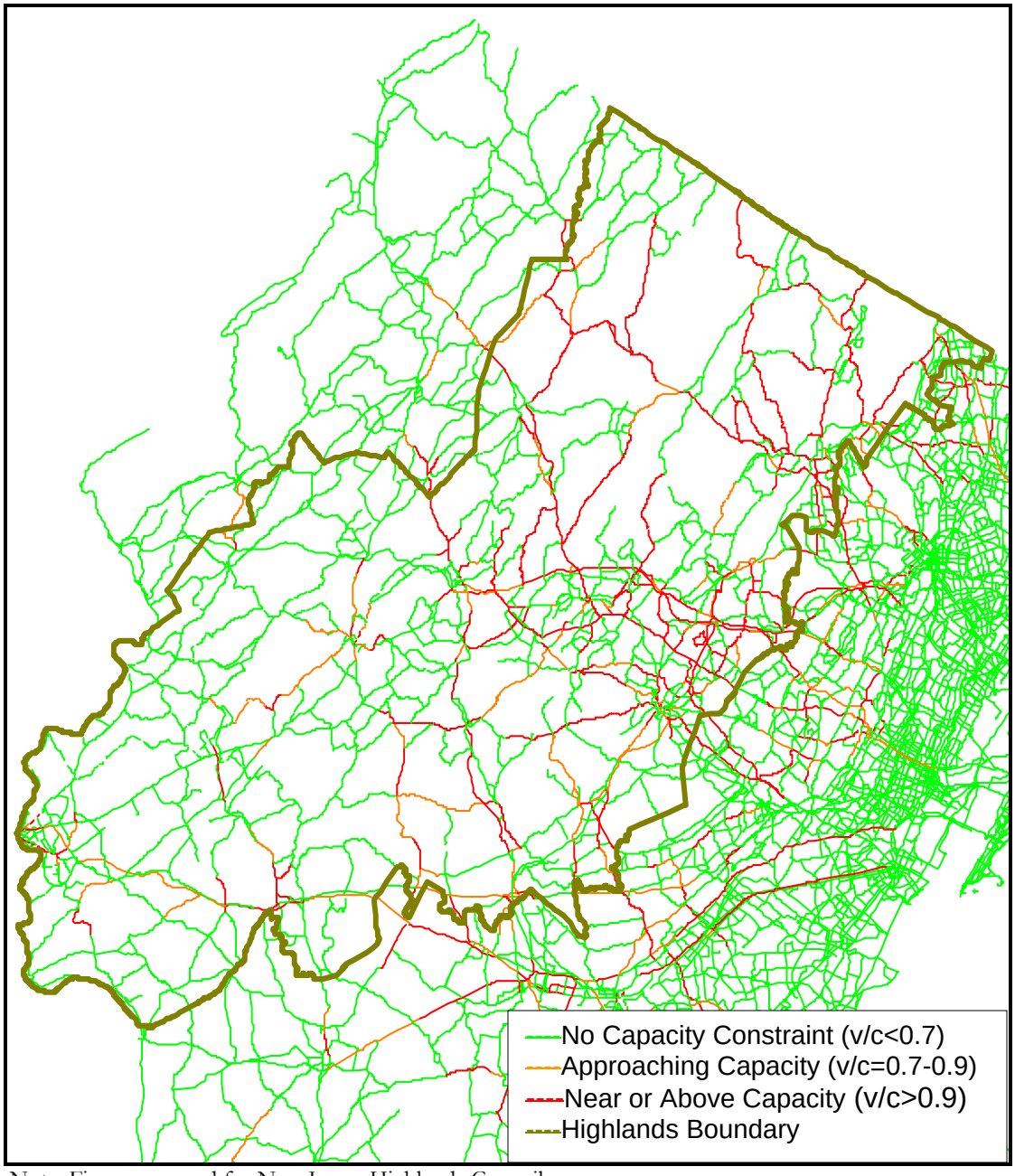
Note: Table prepared for New Jersey Highlands Council

TRAFFIC CONGESTION

The highway assignment for year 2002 estimated the traffic volumes on all roadway segments included in the network. The volume/capacity (v/c) ratios were calculated to identify the existing congestion. Figures 10 and 11 depict the AM and PM peak period v/c ratios in three colors for the base year 2002. The green color represents v/c ratio less than 0.7, generally indicating free flow traffic conditions. The links in yellow represent links with v/c ratio between 0.7 and 0.9 indicating traffic volumes are approaching roadway capacities while red represent links with v/c over 0.9 indicating traffic volume near or above available link capacities. The links in red are expected to have recurring congestion.

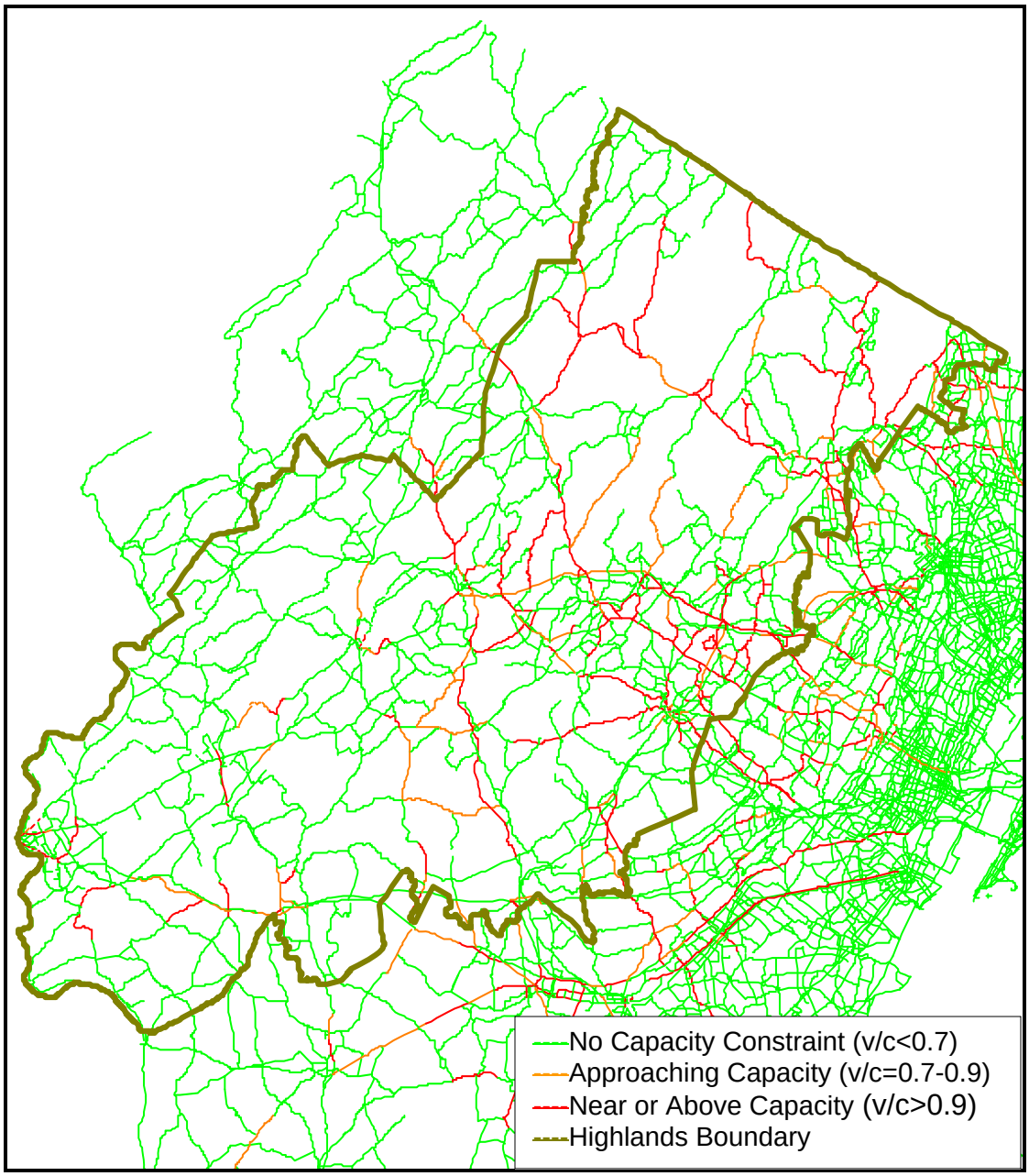
NEXT STEPS

- The Highlands Council will continue to establish the most appropriate mechanism to transfer information between the Highlands Build out Analysis and the transportation model.
- The Baseline Highlands Sub-area Transportation Model will be refined so as to conform to the Highlands Regional Master Plan Land Use Capability Map and build out analysis.
- The refined transportation model will be developed using agency, technical, and stakeholder support.
- The Plan Conformance Process will serve as the opportunity for municipalities to identify Transfer of Development Rights (TDR) receiving zones and regional growth area potential which will inform the next phases of the transportation model.



Note: Figure prepared for New Jersey Highlands Council

Figure 10 - Volume/Capacity Ratios for 2002- AM Peak Hour



Note: Figure prepared for New Jersey Highlands Council

Figure 11 - Volume/Capacity Ratios for 2002 - PM Peak Hour

Background Information on the NJRTM Model

The North Regional Transportation Model (NJRTM) uses TRANPLAN/Viper programs (transportation modeling software) and customized for Tran routines to simulate regional travel. The regional model generally follows the traditional four-step transportation planning process that involves:

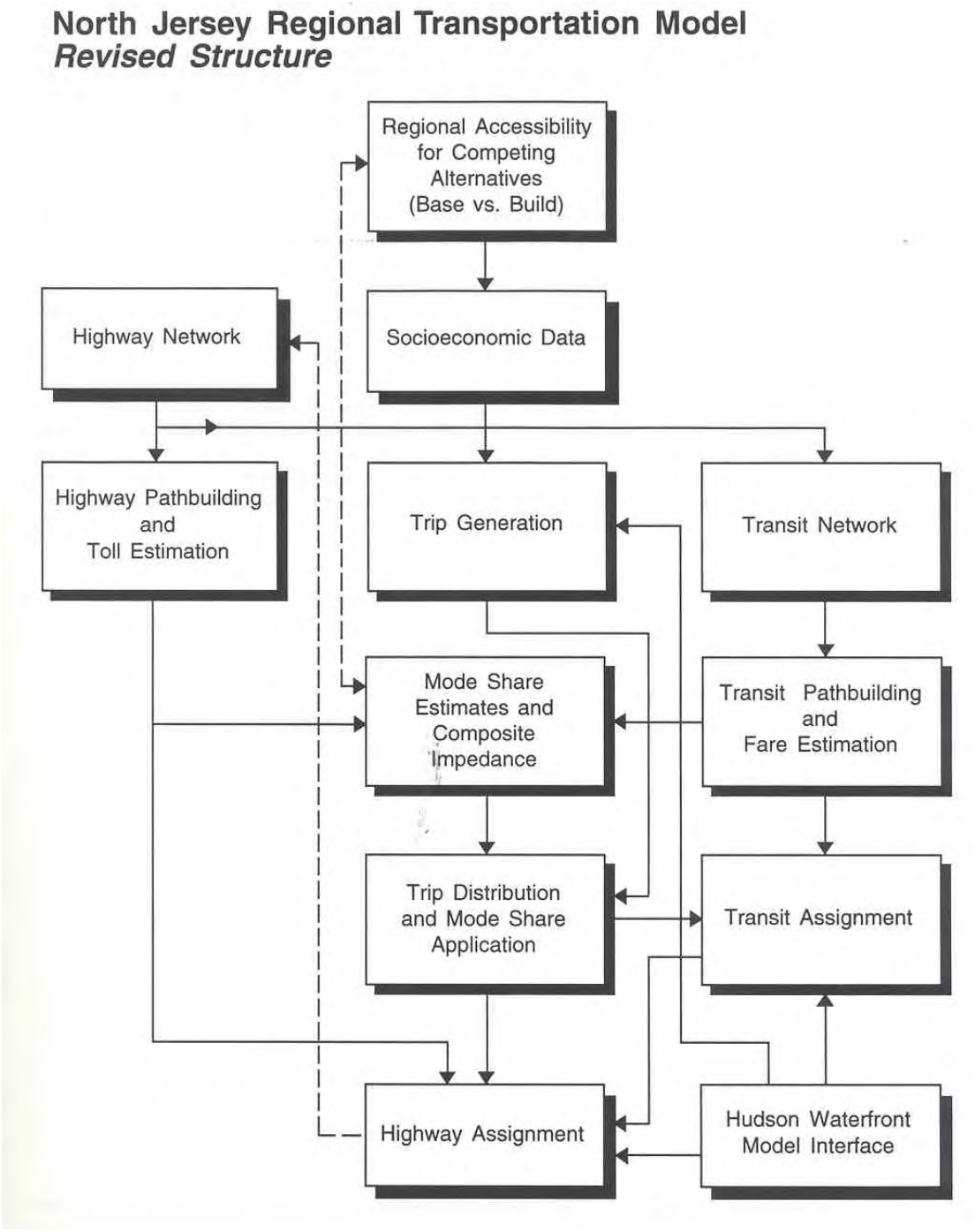
- Trip generation – estimates total trip activity at each traffic analysis zone
- Trip distribution – allocates trips between origin and destination
- Mode choice – allocates trips among the available travel modes (SOV, HOV, Transit)
- Network assignments – assigns trips onto the transportation networks (highway & transit)
- Figure A-1 is a simplified flow chart of the NJRTM modeling process. Figure A-2 shows the geographic coverage of the NJRTM Model.

Time-Periods

The NJRTM Modeling process simulates the annual average weekday traffic for AM, PM, and off-peak time periods by adding the model estimates for the three time periods:

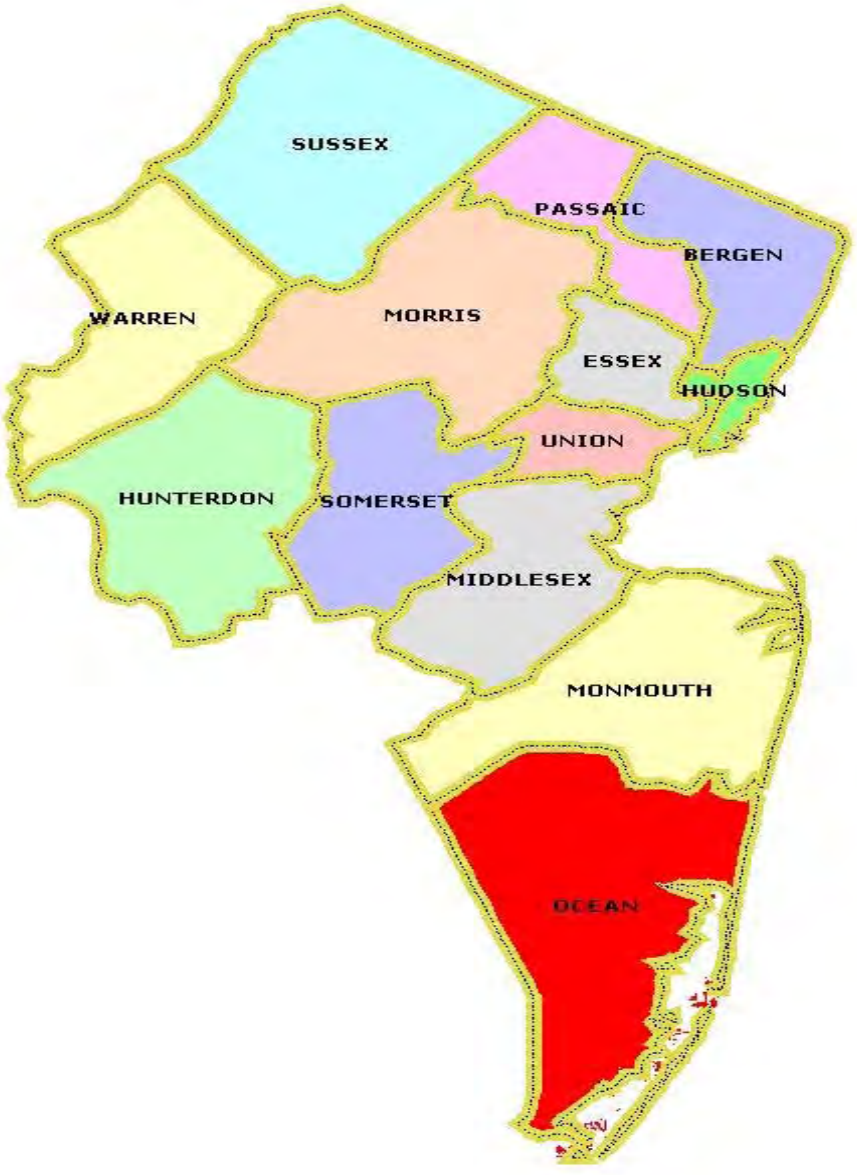
- AM Peak Period: 6:30 – 8:30 AM
- PM Peak Period: 3:30 – 6:00 PM
- Off-Peak Period: Remaining 19.5 hours of the day

Figure A-1



Note: Figure prepared for New Jersey Highlands Council

Figure A-2: North Jersey Regional Transportation Model Area



Note: Figure prepared for New Jersey Highlands Council

HIGHWAY NETWORK

Highway networks are used to estimate the travel times, distance, and costs between zones for auto travel. It is also used to display vehicle trips estimated by highway assignments. The highway network represents the roadways and intersections in a digital format that is required by the modeling software. Links in the highway network represent roadways and nodes represent intersections or interchanges. In the networks, links are coded with physical and operational characteristics such as distance, number of lanes, existence of median, speeds, capacity, and vehicle or turn restrictions. Often, the assignment of speed and capacities are based on the roadway identification codes such as facility type (freeway vs. arterial) and area type (urban vs. rural).

The highway network is used as a foundation for estimating travel times for the trip distribution and mode choice model component. The highway network is also used as input to the highway assignment process.

Facility Type Definitions

Nine separate facility types were established for the North Jersey Region as part of the original NJRTM development. These facility types are listed below, along with their facility type number designation and description. Figure 3 in the main body of this technical memorandum depicts links by facility type in various colors.

Freeways (Facility Type 1) - limited access roadway facilities (including toll facilities) with generally high speed limits (e.g., 55-65 mph), no at-grade intersections, and no traffic signals on the main carriage lanes.

I-78, I-80 and I-287 fall into this category.

Expressways (Facility Type 2) - partially limited access roadway facilities with generally high speed limits, grade separated interchanges with other major facilities, and at-grade intersections with minor facilities.

Portion of NJ 15 in Sussex County falls into this category

Principal Arterials, Divided (Facility Type 3) - arterials with moderately high speed limits (e.g., 35-50 mph), raised center medians with turning bays at intersections, parking restrictions that mainly serve through traffic rather than local property access.

Portions of NJ 23 and US 206 fall into this category.

Principal Arterials, Undivided (Facility Type 4) - same as principal arterials, divided except that there are no raised center medians and, generally, no bays for left turns.

NJ 31, NJ 57, NJ 94 and Portions of NJ 15, NJ 23, US 46, and US 206 fall into this category

Major Arterials, Divided (Facility Type 5) - arterials with moderate speed limits (e.g., 30-45 mph), raised center medians with turning bays at intersections, some parking restrictions that mainly serve through traffic although some local property access is permitted.

The 500 Series County roads, with median, will fall into this category

Major Arterials, Undivided (Facility Type 6) - same as major arterials, divided except that there are no raised center medians and, generally, no bays for left turns.

The 500 Series County roads, without median, fall into this category.

Minor Arterials (Facility Type 7) - arterials with moderately low speed limits (e.g., 25-35 mph) and few parking restrictions that serve some through traffic, some distribution of traffic from principal and major facilities, and some local property access.

Most 600 series roads fall into this category

Collectors/Local (Facility Type 8) - roadways with moderately low speed limits (e.g., 25-35 mph) and few parking restrictions that serve mainly to collect and distribute traffic from principal, major, and minor facilities to local streets and local property access.

Centroid Connectors (Facility Type 9) - "dummy" roadway links with unlimited capacity that serve solely to connect transportation analysis zones to the roadway network. They represent groups of residential streets and access roads not included in the model.

Area Type Definitions

Four separate area types were identified for the North Jersey Region. These area types are listed below, along with their area type number designation and description. Figure 4 in the main body of this technical memorandum depicts links by area type in various colors.

Central Business Districts (CBD) / High Density Urban (Area Type 1) - characterized by high employment densities of greater than 20 employees per acre and/or high population densities of greater than 40 people per acre.

Urban (Area Type 2) - characterized by high residential densities, small lots for single-family dwelling units, many apartments, mostly through streets, and employment areas interspersed throughout the residential areas.

Suburban (Area Type 3) - characterized by relatively low to medium population densities, medium to large lots for single family dwelling units, and traffic flow restrictions such as cul-de-sacs, dead ends, traffic circles, and frequent stop signs.

Rural (Area Type 4) - characterized by very low population densities, large areas of undeveloped and agricultural land, as well as few developed roads.

2002 Baseline Socioeconomic Data within Highlands

COUNTY	MUNICIPALITY	TAZ	Population	Household	Employment			
					Basic	Retail	Service	Total
Bergen	MAHWAH TWP	83	13,953	5,152	3,192	1,268	3,650	8,110
Bergen	MAHWAH TWP	84	10,341	4,290	3,631	1,227	3,694	8,552
Bergen	OAKLAND BORO	99	3,965	1,452	1,099	523	1,334	2,956
Bergen	OAKLAND BORO	100	5,853	1,965	146	13	243	402
Bergen	OAKLAND BORO	101	3,151	1,050	2,509	294	1,344	4,147
Hunterdon	LEBANON BORO	541	7	2	0	0	0	0
Hunterdon	CALIFON BORO	Combined with Lebanon Boro						
Hunterdon	TEWKSBURY TWP	542	5,737	2,048	560	118	750	1,428
Hunterdon	LEBANON TWP	543	6,979	2,388	353	237	1,882	2,472
Hunterdon	GLEN GARDNER BORO	544	3,473	1,362	132	65	413	610
Hunterdon	HAMPTON BORO	Combined with Glen Gardner Boro						
Hunterdon	BETHLEHEM TWP	545	4,718	1,591	389	351	873	1,613
Hunterdon	BLOOMSBURY BORO	Combined with Bethlehem Twp						
Hunterdon	HOLLAND TWP	546	6,415	2,382	745	182	847	1,774
Hunterdon	MILFORD BORO	Combined with Holland Twp						
Hunterdon	ALEXANDRIA TWP	547	4,863	1,569	213	103	1,287	1,603
Hunterdon	UNION TWP	548	6,308	1,700	307	314	845	1,466
Hunterdon	CLINTON TOWN	550	3,762	1,550	3,097	1,402	3,437	7,936
Hunterdon	HIGH BRIDGE BORO	551	3,774	1,427	290	74	523	887
Hunterdon	CLINTON TWP	552	13,626	4,249	1,063	763	4,033	5,859
Hunterdon	TEWKSBURY TWP	562	0	0	0	0	0	0
Morris	PEQUANNOCK TWP	889	7,247	2,621	1,025	702	1,765	3,492
Morris	PEQUANNOCK TWP	890	6,952	2,578	646	209	2,052	2,907
Morris	RIVERDALE BORO	891	2,528	935	1,369	524	1,613	3,506
Morris	BUTLER BORO	892	3,676	1,461	509	128	902	1,539
Morris	BUTLER BORO	893	3,887	1,492	452	456	871	1,779
Morris	KINNELON BORO	894	5,569	1,821	175	249	710	1,134
Morris	KINNELON BORO	895	3,852	1,269	70	165	371	606
Morris	MONTVILLE TWP	896	4,752	1,628	637	61	404	1,102
Morris	MONTVILLE TWP	897	9,327	3,407	1,341	218	1,569	3,128
Morris	MONTVILLE TWP	898	6,835	2,401	2,913	410	1,586	4,909
Morris	BOONTON TWP	899	4,315	1,490	382	14	1,074	1,470
Morris	BOONTON TOWN	900	4,932	1,911	1,017	678	1,270	2,965
Morris	BOONTON TOWN	901	3,574	1,377	378	293	756	1,427
Morris	MOUNTAIN LAKES BORO	902	4,299	1,338	829	205	2,051	3,085
Morris	DENVILLE TWP	903	4,878	1,954	512	109	1,103	1,724
Morris	DENVILLE TWP	904	5,467	2,076	1,150	843	5,836	7,829
Morris	DENVILLE TWP	905	5,560	2,019	651	477	965	2,093
Morris	PARSIPPANY-TROY HILLS TWP	906	6,516	2,585	42	27	360	429
Morris	PARSIPPANY-TROY HILLS TWP	907	3,051	1,153	2,029	359	1,911	4,299
Morris	PARSIPPANY-TROY HILLS TWP	908	4,603	1,858	1,023	453	3,363	4,839

COUNTY	MUNICIPALITY	TAZ	Population	Household	Employment			
					Basic	Retail	Service	Total
Morris	PARSIPPANY-TROY HILLS TWP	909	4,783	1,597	459	201	5,479	6,139
Morris	PARSIPPANY-TROY HILLS TWP	910	5,499	2,422	21	2	91	114
Morris	PARSIPPANY-TROY HILLS TWP	911	3,506	1,204	108	197	374	679
Morris	PARSIPPANY-TROY HILLS TWP	912	6,955	3,213	349	1,019	2,166	3,534
Morris	PARSIPPANY-TROY HILLS TWP	913	4,512	1,786	707	632	2,533	3,872
Morris	PARSIPPANY-TROY HILLS TWP	914	3,095	1,168	519	564	2,166	3,249
Morris	PARSIPPANY-TROY HILLS TWP	915	5,091	1,755	579	1,360	11,217	13,156
Morris	PARSIPPANY-TROY HILLS TWP	916	3,413	1,073	4,286	2,824	4,634	11,744
Morris	HANOVER TWP	919	4,130	1,486	8,586	2,315	5,210	16,111
Morris	HANOVER TWP	920	4,080	1,628	2,372	97	7,553	10,022
Morris	HANOVER TWP	921	4,880	1,744	2,070	461	3,163	5,694
Morris	MORRIS PLAINS BORO	922	2,178	835	125	261	868	1,254
Morris	MORRIS PLAINS BORO	923	3,070	1,142	4,381	257	2,728	7,366
Morris	MORRIS PLAINS BORO	924	0	0	0	0	0	0
Morris	MORRIS TWP	933	2,599	993	2,825	274	1,559	4,658
Morris	MORRIS TWP	934	2,762	1,192	1,944	102	1,447	3,493
Morris	MORRIS TWP	935	3,641	1,455	1,117	33	858	2,008
Morris	MORRIS TWP	936	7,135	2,630	122	94	1,167	1,383
Morris	MORRIS TWP	937	5,307	1,874	26	19	1,910	1,955
Morris	MORRISTOWN TOWN	938	3,896	1,137	310	63	564	937
Morris	MORRISTOWN TOWN	939	4,971	2,376	861	1,086	3,048	4,995
Morris	MORRISTOWN TOWN	940	3,253	1,392	624	972	4,331	5,927
Morris	MORRISTOWN TOWN	941	6,705	2,410	120	1,575	3,787	5,482
Morris	HARDING TWP	946	3,209	1,196	2,728	163	1,155	4,046
Morris	ROCKAWAY BORO	947	6,471	2,451	1,318	777	3,920	6,015
Morris	ROCKAWAY TWP	948	5,445	1,901	1,178	102	582	1,862
Morris	ROCKAWAY TWP	949	9,126	3,083	1,920	2,052	2,350	6,322
Morris	ROCKAWAY TWP	950	5,038	2,060	6,287	490	1,474	8,251
Morris	ROCKAWAY TWP	951	3,894	1,328	1,414	93	415	1,922
Morris	JEFFERSON TWP	952	10,840	3,835	432	391	1,218	2,041
Morris	JEFFERSON TWP	953	9,283	3,512	446	540	1,453	2,439
Morris	DOVER TOWN	954	7,545	2,103	833	184	1,246	2,263
Morris	DOVER TOWN	955	5,748	1,688	13	15	284	312
Morris	DOVER TOWN	956	5,365	1,698	861	704	1,816	3,381
Morris	WHARTON BORO	957	6,327	2,333	801	331	1,449	2,581
Morris	MINE HILL TWP	958	3,680	1,371	159	53	556	768
Morris	ROXBURY TWP	959	4,615	1,670	925	1,632	1,986	4,543

COUNTY	MUNICIPALITY	TAZ	Population	Household	Employment			
					Basic	Retail	Service	Total
Morris	MOUNT ARLINGTON BORO	960	4,767	1,983	182	243	709	1,134
Morris	ROXBURY TWP	961	5,720	2,072	514	202	813	1,529
Morris	ROXBURY TWP	962	13,084	4,367	492	1,311	1,906	3,709
Morris	VICTORY GARDENS BORO	963	1,546	562	1	22	45	68
Morris	RANDOLPH TWP	964	9,841	3,842	1,503	1,316	3,116	5,935
Morris	RANDOLPH TWP	965	15,271	4,953	550	337	2,226	3,113
Morris	MENDHAM BORO	966	5,118	1,797	152	524	1,133	1,809
Morris	MENDHAM TWP	967	5,489	1,809	81	10	785	876
Morris	CHESTER BORO	968	1,641	613	277	962	1,280	2,519
Morris	CHESTER TWP	969	7,406	2,378	527	147	919	1,593
Morris	NETCONG BORO	970	3,197	1,370	171	263	697	1,131
Morris	MOUNT OLIVE TWP	971	12,607	4,817	2,422	404	1,579	4,405
Morris	MOUNT OLIVE TWP	972	12,069	4,452	1,429	862	2,318	4,609
Morris	WASHINGTON TWP	973	12,948	4,205	958	252	1,318	2,528
Morris	WASHINGTON TWP	974	4,878	1,672	153	324	928	1,405
Passaic	BLOOMINGDALE BORO	1063	7,715	2,856	351	170	1,535	2,056
Passaic	POMPTON LAKES BORO	1127	11,079	4,174	608	419	2,754	3,781
Passaic	RINGWOOD BORO	1129	12,525	4,183	832	392	1,652	2,876
Passaic	WANAQUE BORO	1132	10,302	3,473	1,046	383	1,993	3,422
Passaic	WEST MILFORD TWP	1144	4,606	1,623	322	427	472	1,221
Passaic	WEST MILFORD TWP	1145	4,604	1,831	103	135	991	1,229
Passaic	WEST MILFORD TWP	1146	7,441	2,497	125	36	665	826
Passaic	WEST MILFORD TWP	1147	5,430	1,875	67	12	131	210
Passaic	WEST MILFORD TWP	1148	5,259	1,852	607	192	802	1,601
Somerset	BERNARDS TWP	1178	5,214	1,952	5,312	916	3,352	9,580
Somerset	BERNARDS TWP	1179	543	6	0	0	293	293
Somerset	BERNARDS TWP	1180	8,102	2,859	136	309	1,461	1,906
Somerset	BERNARDS TWP	1181	11,838	4,816	529	129	1,890	2,548
Somerset	BERNARDSVILLE BORO	1182	7,487	2,734	623	856	2,184	3,663
Somerset	PEAPACK GLADSTONE BORO	1183	2,448	856	1,664	219	1,853	3,736
Somerset	FAR HILLS BORO	1184	871	377	58	43	182	283
Somerset	BEDMINSTER TWP	1185	8,305	4,245	1,536	777	2,999	5,312
Sussex	VERNON TWP	1209	3,539	1,102	440	228	321	989
Sussex	VERNON TWP	1210	3,977	1,263	85	25	83	193
Sussex	VERNON TWP	1213	3,438	1,552	269	256	4,639	5,164
Sussex	VERNON TWP	1215	5,703	1,748	209	140	283	632
Sussex	VERNON TWP	1216	8,828	3,022	142	52	196	390

COUNTY	MUNICIPALITY	TAZ	Population	Household	Employment

					Basic	Retail	Service	Total
Sussex	GREEN TWP	1227	3,300	1,084	90	37	744	871
Sussex	BYRAM TWP	1231	2,253	766	81	8	93	182
Sussex	HOPATCONG BORO	1232	1,239	474	29	1	59	89
Sussex	STANHOPE BORO	1233	3,662	1,423	230	284	306	820
Sussex	HOPATCONG BORO	1234	4,683	1,707	52	78	150	280
Sussex	HOPATCONG BORO	1235	4,378	1,605	35	39	724	798
Sussex	HOPATCONG BORO	1236	913	349	0	0	0	0
Sussex	BYRAM TWP	1237	2,468	858	89	284	421	794
Sussex	BYRAM TWP	1238	3,731	1,271	59	24	585	668
Sussex	HOPATCONG BORO	1239	4,769	1,571	66	109	60	235
Sussex	HARDYSTON TWP	1240	4,037	1,480	50	87	230	367
Sussex	HAMBURG BORO	1241	3,195	1,227	519	244	429	1,192
Sussex	FRANKLIN BORO	1242	1,823	683	211	168	254	633
Sussex	FRANKLIN BORO	1243	3,426	1,251	635	404	628	1,667
Sussex	HARDYSTON TWP	1244	2,480	1,035	232	11	66	309
Sussex	SPARTA TWP	1245	3,757	1,145	61	4	167	232
Sussex	SPARTA TWP	1246	8,230	3,203	111	204	387	702
Sussex	SPARTA TWP	1247	2,861	944	301	188	563	1,052
Sussex	SPARTA TWP	1248	3,745	1,171	1,032	360	1,842	3,234
Sussex	OGDENSBURG BORO	1249	2,669	891	105	42	143	290
Warren	PHILLIPSBURG TOWN	1355	3,163	1,209	181	283	534	998
Warren	PHILLIPSBURG TOWN	1356	4,038	1,781	472	442	1,245	2,159
Warren	PHILLIPSBURG TOWN	1357	4,972	1,903	66	100	410	576
Warren	PHILLIPSBURG TOWN	1358	3,066	1,184	580	130	187	897
Warren	FRELINGHUYSEN TWP	1360	5,241	1,883	220	99	952	1,271
Warren	HOPE TWP	1361	4,770	1,719	278	186	747	1,211
Warren	LIBERTY TWP	Combined with Hope Twp						
Warren	INDEPENDENCE TWP	1362	5,709	2,187	404	50	219	673
Warren	ALLAMUCHY TWP	1363	3,949	1,723	240	90	263	593
Warren	HACKETTSTOWN TOWN	1364	3,437	1,447	1,818	552	972	3,342
Warren	HACKETTSTOWN TOWN	1365	5,738	2,430	408	668	1,701	2,777
Warren	MANSFIELD TWP	1366	8,304	2,709	273	641	1,407	2,321
Warren	WHITE TWP	1367	4,655	1,835	824	252	658	1,734
Warren	OXFORD TWP	1368	2,445	939	271	60	197	528
Warren	BELVIDERE TOWN	1369	2,787	1,094	615	123	788	1,526
Warren	HARMONY TWP	1370	2,779	1,029	261	86	211	558
Warren	WASHINGTON TWP	1371	6,465	2,172	172	181	686	1,039
Warren	WASHINGTON BORO	1372	6,828	2,773	997	636	1,502	3,135

COUNTY	MUNICIPALITY	TAZ	Population	Household	Employment			
					Basic	Retail	Service	Total
Warren	FRANKLIN TWP	1373	2,946	1,035	361	138	546	1,045
Warren	GREENWICH TWP	1374	4,765	1,552	236	324	250	810
Warren	LOPATCONG TWP	1375	6,668	2,498	2,267	293	1,174	3,734
Warren	POHATCONG TWP	1376	3,442	1,352	378	1,566	558	2,502
Warren	ALPHA BORO	1377	2,500	996	567	68	258	893
Total			**801,914**	**291,668**	**127,055**	**58,288**	**216,263**	**401,606**

Note: Table prepared for New Jersey Highlands Council

APPENDIX B
Air Quality Conformity
(Full Report)

EXECUTIVE SUMMARY

This section provides an overview of the Air Quality Conformity Analysis with respect to on-road mobile source pollution which will serve to support the development of the Highlands Regional Master Plan (RMP). This analysis is based on the North Jersey Regional Transportation Model (NJRTM) and uses a set of assumptions in order to capture transportation-related mobile source pollution and corresponding air quality implications. The Highlands Water Protection and Planning Council (Highlands Council) retained a modeling consultant in order to assist in the analysis of transportation patterns and air quality conditions. The analysis documents the base year 2002 traffic pattern and system status in terms of air quality using a model developed specifically for the Highlands Region. The Council consulted with the New Jersey Department of Transportation (NJDOT) as well as other agencies, and technical and local stakeholders in order to develop an approach and methodology. The Highlands Council has also compiled a technical report which included a similar approach for stationary pollutant sources, broader air quality concerns, and existing programs at the federal, state and regional levels.

INTRODUCTION

Each of the seven counties included in the Highlands Region is currently a nonattainment area for at least one air quality measure. Nonattainment status is imposed when air pollution levels persistently exceed the National Ambient Air Quality Standards (NAAQS). Areas that either fail or have failed to meet air quality standards must ensure that new transportation plans and projects do not further contribute to air quality degradation. This process is known as air quality conformity. By documenting transportation conditions, this analysis determines the impact from 2002 traffic patterns and conditions on regional air quality.

This analysis estimated the air-quality performance measures using the base year 2002 model transportation conditions. The base year 2002 model run serves as the baseline for comparison of future Highlands Region build out scenarios. Note that there is no reference emissions level that can be used in order to compare against the Highlands Region model, such as "emission budget" used by the North Jersey Transportation Planning Authority (NJTPA) transportation conformity analysis to determine conformity with the State Implementation Plan (SIP) for attainment of the NAAQS.

LEGAL REQUIREMENTS FOR INCLUSION IN THE REGIONAL MASTER PLAN

Section 11.a.(1)(a) of the Highlands Water Protection and Planning Act (Highlands Act) mandates that the regional master plan shall include:

11.a. (1)(a) *A resource assessment which determines the amount and type of human development and activity which the ecosystem of the Highlands Region can sustain while still maintaining the overall ecological values thereof, with special reference to...air quality.*

AIR QUALITY CONFORMITY ANALYSIS

Methodology

The purpose of estimating the air-quality performance measures during the initial phase of the project was to develop a process which provides information down to the link level. For the purposes of this analysis, a link represents a transportation connection which is assigned physical attributes such as: number of lanes, average free flow speed, and general lane capacities. A process was also needed to develop emissions at the link level in addition to the county level. The standard air-quality analysis for the NJTPA is performed using the PPSuite, a program that incorporates EPA Mobile 6.2 model which is used by many agencies. Mobile 6.2 is an EPA emissions factor model for estimating pollution from on-road motor vehicles. PPSuite is a preprocessor and postprocessor to Mobile 6.2. It produces output of emission factors and measurements based on the Mobile 6.2 model, allowing the user to perform adjustments on those outputs. The program was developed by the Federal Environmental Protection Agency (EPA) for the mobile emission sources.

The emissions inventories were developed following the industry standard process using Mobile 6.2. Mobile 6.2 provides emission estimates for the following pollutants: Ozone (Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOX)), Carbon Monoxide (CO) and Particulate Matter 2.5. Particulate Matter (PM) 2.5 is calculated only for those counties in nonattainment of this pollutant. The number 2.5 defines the maximum size of the particulate matter being recorded which must be 2.5 micrometers in diameter or smaller. The emissions factors were developed using the assumptions and input data consistent with the one used for the 2002 Baseline Interim PM2.5 Emissions Project. The majority of input data for this project was provided by NJDOT and NJDEP, such as:

- Temperature and Humidity Data
- Vehicle Type Mix
- Inspection and Maintenance Program
- Vehicle Registration Distribution
- Diesel Fraction

The emissions factors were defined as emissions per vehicle per mile (in kilograms or tons). To obtain the emission estimates for each pollutant, the emission factors were multiplied by vehicle miles traveled (VMT). The emission estimates are usually expressed in tons/day or tons/year. The ozone emissions were developed for the conditions of highest ozone that typically occur during the warmest summer days of the year, while the CO emissions were developed for the conditions of highest CO that typically occur during the winter. The PM2.5 emissions were developed using a two-season approach, consistent with the 2002 Baseline Interim PM2.5 Emissions Project. This approach determined the PM2.5 emission factors for one "average" summer day and one "average" winter day. Since the emissions estimates for PM2.5 are generally expressed in annual terms, the average summer emissions factor was weighted by 183 days and winter by 182 days.

Development of Annual Emissions for 2002 Highlands Region

The link level emissions were developed using a series of tables for each pollutant based on the type of roadway, county, and the average travel speed on the link. Similar to the NJTPA analysis, links were divided into three categories: Freeways (e.g. I-78, I-80 and I-287), Arterials (e.g. NJ 23, US 46), and Collectors/Local (smaller roadways with moderately low speed limits). Each link in the network was coded with revised county codes for the Highlands Region. The values from these tables were multiplied with the link VMT, in order to estimate annual emissions. Those values were then aggregated at the county level for different zones within the region. The summary of annual emissions is presented in Table 1 for the base year 2002. It is estimated that the vehicles traveling within the Highlands Region will emit on an annual basis: 178,000 tons of CO, 8,000 tons of VOC, 18,900 tons of NOX and 210 tons of PM2.5.

These tables were developed for speeds ranging from 2.5 mph to 65 mph evaluated at an increment of 2.5 mph. The pollutant emission levels, measured in terms of grams per vehicle mile, were examined at various speeds. Several trends were observed. For CO and NOX, it was found that pollution intensity diminished at increasing speed increments until reaching 35 mph, thereafter the amount of pollution emitted increased until reaching the highest evaluated speed of 65 mph. PM2.5 followed a similar trend, however, once 35 mph was reached, the amount of measured pollution remained constant. VOC emissions were highest at 2.5 mph and lowest at 65 mph

NEXT STEPS

The air conformity analysis will serve as a baseline for comparison with future Highlands buildout scenarios in subsequent phases of Regional Master Plan implementation.

Table 1: Summary of Annual Emission Estimates (tons) for 2002

NJ County		CO	VOC	NOX	PM2.5
Name	In/Out of Highlands				
Bergen	Outside Highlands	120,440	6,047	13,110	237.2
Bergen	Inside Highlands	9,636	433	1,088	18.4
Hunterdon	Outside Highlands	15,519	703	1,450	NA
Hunterdon	Inside Highlands	19,268	801	2,898	NA
Morris	Outside Highlands	8,814	429	767	13.4
Morris	Inside Highlands	93,223	4,182	8,465	140.5
Passaic	Outside Highlands	48,155	2,378	5,643	102.7
Passaic	Inside Highlands	10,278	497	1,105	19.6
Somerset	Outside Highlands	43,812	2,234	4,803	90.0
Somerset	Inside Highlands	15,477	668	1,896	31.1
Sussex	Outside Highlands	7,777	383	701	NA
Sussex	Inside Highlands	12,711	628	1,212	NA
Warren	Outside Highlands	4,666	176	894	NA
Warren	Inside Highlands	17,047	735	2,227	NA
Total Inside Highlands Region		**177,639**	**7,944**	**18,891**	**209.6**

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Bergen County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	51.179	6.734	4.409	19.016	53.561	7.313	3.728	15.184	54.829	7.467	2.771	8.158
5.0	35.119	3.101	4.006	19.016	34.221	2.953	3.294	15.184	34.664	2.936	2.408	8.158
7.5	28.507	2.139	3.533	19.016	28.144	2.138	2.913	15.184	28.599	2.110	2.102	8.158
10.0	25.159	1.718	3.256	19.016	25.105	1.730	2.723	15.184	25.566	1.697	1.949	8.158
12.5	23.314	1.497	3.016	19.016	23.469	1.531	2.507	15.184	24.041	1.505	1.780	8.158
15.0	22.127	1.358	2.837	19.016	22.378	1.399	2.364	15.184	23.024	1.377	1.667	8.158
17.5	21.549	1.266	2.750	19.016	21.568	1.295	2.247	15.184	22.289	1.278	1.581	8.139
20.0	21.210	1.200	2.700	19.016	20.961	1.216	2.160	15.184	21.737	1.204	1.516	8.139
22.5	20.941	1.151	2.659	18.980	20.529	1.159	2.090	15.129	21.356	1.151	1.465	8.103
25.0	20.725	1.112	2.626	18.943	20.184	1.114	2.035	15.074	21.051	1.109	1.424	8.066
27.5	20.550	1.080	2.604	18.907	20.003	1.078	1.994	15.038	20.908	1.077	1.391	7.993
30.0	20.406	1.049	2.584	18.870	19.853	1.048	1.960	15.001	20.789	1.050	1.363	7.957
32.5	20.417	1.026	2.579	18.834	19.898	1.021	1.945	14.965	20.868	1.025	1.348	7.920
35.0	20.449	1.002	2.574	18.797	19.936	0.998	1.932	14.928	20.935	1.004	1.335	7.884
37.5	20.786	0.986	2.595	18.797	20.295	0.982	1.949	14.928	21.337	0.990	1.344	7.884
40.0	21.100	0.971	2.619	18.797	20.609	0.969	1.964	14.928	21.688	0.978	1.351	7.884
42.5	21.452	0.958	2.662	18.797	20.978	0.956	1.997	14.928	22.091	0.967	1.367	7.884
45.0	21.805	0.946	2.713	18.797	21.307	0.945	2.026	14.928	22.448	0.957	1.381	7.884
47.5	22.172	0.934	2.778	18.797	21.687	0.934	2.075	14.928	22.852	0.947	1.402	7.884
50.0	22.565	0.924	2.866	18.797	22.028	0.924	2.119	14.928	23.215	0.937	1.420	7.884
52.5	22.948	0.915	2.959	18.797	22.419	0.915	2.188	14.928	23.621	0.929	1.447	7.884
55.0	23.396	0.909	3.102	18.797	22.774	0.907	2.251	14.928	23.989	0.921	1.472	7.884
57.5	23.841	0.903	3.261	18.797	23.186	0.901	2.349	14.928	24.399	0.915	1.507	7.884
60.0	24.316	0.899	3.463	18.797	23.564	0.896	2.438	14.928	24.775	0.909	1.540	7.884
62.5	24.447	0.898	3.518	18.797	23.995	0.892	2.574	14.928	25.189	0.904	1.587	7.884
65.0	24.578	0.897	3.573	18.797	24.393	0.888	2.700	14.928	25.572	0.899	1.630	7.884

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors

Hunterdon County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	51.222	6.504	5.920	NA	56.047	7.335	3.893	NA	56.565	7.379	3.271	NA
5.0	35.916	3.077	5.432	NA	36.295	3.009	3.448	NA	36.437	2.937	2.870	NA
7.5	29.347	2.151	4.878	NA	29.988	2.184	3.056	NA	30.256	2.118	2.525	NA
10.0	25.987	1.741	4.555	NA	26.835	1.771	2.860	NA	27.166	1.709	2.353	NA
12.5	24.025	1.518	4.262	NA	25.114	1.568	2.637	NA	25.557	1.514	2.159	NA
15.0	22.731	1.375	4.040	NA	23.967	1.432	2.488	NA	24.484	1.384	2.030	NA
17.5	22.031	1.276	3.911	NA	23.115	1.325	2.367	NA	23.697	1.283	1.928	NA
20.0	21.585	1.204	3.824	NA	22.475	1.245	2.276	NA	23.107	1.206	1.851	NA
22.5	21.229	1.148	3.754	NA	22.018	1.186	2.204	NA	22.693	1.152	1.790	NA
25.0	20.942	1.104	3.697	NA	21.652	1.139	2.146	NA	22.362	1.108	1.742	NA
27.5	20.713	1.067	3.660	NA	21.454	1.102	2.104	NA	22.198	1.074	1.705	NA
30.0	20.523	1.036	3.631	NA	21.289	1.071	2.069	NA	22.061	1.046	1.674	NA
32.5	20.491	1.006	3.622	NA	21.322	1.043	2.055	NA	22.124	1.020	1.659	NA
35.0	20.485	0.981	3.617	NA	21.350	1.019	2.043	NA	22.178	0.998	1.646	NA
37.5	20.772	0.962	3.650	NA	21.701	1.002	2.061	NA	22.566	0.983	1.659	NA
40.0	21.044	0.945	3.686	NA	22.008	0.988	2.077	NA	22.906	0.970	1.670	NA
42.5	21.360	0.930	3.753	NA	22.373	0.975	2.113	NA	23.300	0.958	1.695	NA
45.0	21.683	0.917	3.835	NA	22.698	0.963	2.145	NA	23.650	0.948	1.717	NA
47.5	22.025	0.904	3.939	NA	23.076	0.952	2.199	NA	24.050	0.937	1.752	NA
50.0	22.402	0.894	4.083	NA	23.417	0.942	2.248	NA	24.410	0.927	1.784	NA
52.5	22.773	0.884	4.234	NA	23.809	0.933	2.326	NA	24.816	0.919	1.833	NA
55.0	23.219	0.877	4.471	NA	24.165	0.925	2.396	NA	25.185	0.911	1.877	NA
57.5	23.669	0.872	4.737	NA	24.608	0.921	2.505	NA	25.600	0.904	1.945	NA
60.0	24.164	0.867	5.074	NA	25.014	0.918	2.605	NA	25.982	0.898	2.007	NA
62.5	24.302	0.866	5.167	NA	25.479	0.916	2.758	NA	26.410	0.894	2.100	NA
65.0	24.440	0.865	5.260	NA	25.908	0.914	2.900	NA	26.805	0.889	2.186	NA

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors
NA – Not Applicable

Morris County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	52.230	6.848	3.569	13.505	54.008	7.368	3.395	12.738	54.639	7.445	2.950	9.508
5.0	35.614	3.101	3.213	13.505	34.378	2.948	2.985	12.738	34.608	2.946	2.574	9.508
7.5	28.931	2.122	2.784	13.505	28.304	2.129	2.631	12.738	28.527	2.120	2.254	9.508
10.0	25.567	1.695	2.532	13.505	25.266	1.719	2.454	12.738	25.487	1.708	2.094	9.508
12.5	23.776	1.476	2.321	13.505	23.668	1.523	2.254	12.738	23.936	1.514	1.916	9.508
15.0	22.643	1.341	2.165	13.505	22.603	1.392	2.121	12.738	22.903	1.385	1.798	9.508
17.5	22.132	1.253	2.103	13.505	21.818	1.289	2.015	12.738	22.152	1.285	1.706	9.508
20.0	21.852	1.191	2.073	13.505	21.230	1.212	1.936	12.738	21.588	1.210	1.637	9.508
22.5	21.632	1.146	2.049	13.468	20.816	1.157	1.872	12.683	21.196	1.156	1.582	9.453
25.0	21.455	1.110	2.028	13.432	20.484	1.112	1.822	12.629	20.883	1.113	1.539	9.399
27.5	21.311	1.080	2.014	13.395	20.317	1.078	1.784	12.592	20.732	1.080	1.504	9.362
30.0	21.193	1.055	2.003	13.359	20.178	1.049	1.752	12.556	20.606	1.053	1.475	9.326
32.5	21.230	1.031	1.997	13.322	20.234	1.023	1.737	12.519	20.678	1.028	1.460	9.289
35.0	21.285	1.009	1.992	13.286	20.282	1.001	1.724	12.483	20.739	1.006	1.447	9.234
37.5	21.654	0.994	2.007	13.286	20.656	0.986	1.738	12.483	21.131	0.992	1.458	9.234
40.0	21.997	0.980	2.024	13.286	20.982	0.973	1.750	12.483	21.475	0.979	1.467	9.234
42.5	22.375	0.968	2.052	13.286	21.363	0.960	1.777	12.483	21.871	0.968	1.486	9.234
45.0	22.750	0.957	2.087	13.286	21.702	0.949	1.801	12.483	22.222	0.957	1.503	9.234
47.5	23.135	0.946	2.129	13.286	22.090	0.939	1.840	12.483	22.621	0.947	1.529	9.234
50.0	23.542	0.936	2.186	13.286	22.439	0.929	1.876	12.483	22.980	0.937	1.552	9.234
52.5	23.936	0.927	2.246	13.286	22.835	0.920	1.930	12.483	23.382	0.929	1.587	9.234
55.0	24.384	0.920	2.336	13.286	23.195	0.912	1.980	12.483	23.747	0.921	1.619	9.234
57.5	24.824	0.915	2.437	13.286	23.606	0.906	2.056	12.483	24.161	0.915	1.666	9.234
60.0	25.286	0.910	2.562	13.286	23.984	0.901	2.125	12.483	24.539	0.909	1.709	9.234
62.5	25.414	0.908	2.597	13.286	24.409	0.896	2.230	12.483	24.960	0.905	1.773	9.234
65.0	25.542	0.906	2.632	13.286	24.802	0.892	2.328	12.483	25.348	0.901	1.832	9.234

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors

Passaic County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	50.661	6.678	4.857	21.936	53.683	7.327	3.620	14.399	54.664	7.447	2.941	9.435
5.0	34.881	3.107	4.429	21.936	34.259	2.948	3.193	14.399	34.620	2.947	2.565	9.435
7.5	28.294	2.154	3.933	21.936	28.190	2.132	2.821	14.399	28.536	2.122	2.247	9.435
10.0	24.948	1.734	3.642	21.936	25.155	1.724	2.635	14.399	25.494	1.709	2.087	9.435
12.5	23.070	1.512	3.387	21.936	23.533	1.526	2.425	14.399	23.943	1.515	1.910	9.435
15.0	21.852	1.371	3.195	21.936	22.452	1.395	2.284	14.399	22.909	1.386	1.792	9.435
17.5	21.236	1.277	3.096	21.936	21.652	1.291	2.171	14.399	22.158	1.286	1.700	9.435
20.0	20.863	1.208	3.035	21.918	21.051	1.213	2.086	14.399	21.595	1.210	1.631	9.435
22.5	20.567	1.157	2.985	21.899	20.626	1.157	2.019	14.344	21.203	1.157	1.577	9.362
25.0	20.328	1.116	2.945	21.863	20.285	1.112	1.965	14.308	20.890	1.114	1.533	9.326
27.5	20.136	1.082	2.918	21.826	20.109	1.076	1.925	14.253	20.739	1.081	1.499	9.289
30.0	19.977	1.053	2.898	21.790	19.963	1.047	1.892	14.216	20.614	1.054	1.470	9.253
32.5	19.974	1.026	2.890	21.753	20.012	1.020	1.877	14.180	20.685	1.028	1.455	9.198
35.0	19.993	1.002	2.885	21.717	20.053	0.997	1.864	14.143	20.746	1.007	1.442	9.161
37.5	20.311	0.984	2.910	21.717	20.418	0.982	1.880	14.143	21.139	0.993	1.452	9.161
40.0	20.609	0.969	2.938	21.717	20.736	0.969	1.894	14.143	21.483	0.980	1.461	9.161
42.5	20.947	0.955	2.987	21.717	21.110	0.956	1.925	14.143	21.878	0.969	1.480	9.161
45.0	21.288	0.943	3.048	21.717	21.442	0.945	1.952	14.143	22.230	0.958	1.497	9.161
47.5	21.644	0.931	3.124	21.717	21.825	0.934	1.998	14.143	22.629	0.948	1.523	9.161
50.0	22.029	0.921	3.229	21.717	22.169	0.924	2.039	14.143	22.988	0.938	1.546	9.161
52.5	22.406	0.912	3.339	21.717	22.562	0.916	2.104	14.143	23.390	0.930	1.581	9.161
55.0	22.857	0.906	3.511	21.717	22.919	0.907	2.162	14.143	23.755	0.922	1.612	9.161
57.5	23.307	0.900	3.702	21.717	23.329	0.901	2.253	14.143	24.169	0.916	1.659	9.161
60.0	23.792	0.897	3.944	21.717	23.705	0.896	2.335	14.143	24.549	0.910	1.702	9.161
62.5	23.927	0.896	4.011	21.717	24.133	0.892	2.461	14.143	24.970	0.906	1.765	9.161
65.0	24.062	0.895	4.078	21.717	24.528	0.888	2.578	14.143	25.359	0.902	1.823	9.161

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors

Somerset County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	51.357	6.754	4.289	18.250	53.344	7.287	3.913	16.571	54.137	7.382	3.241	11.625
5.0	35.207	3.105	3.893	18.250	34.152	2.961	3.466	16.571	34.407	2.934	2.843	11.625
7.5	28.576	2.140	3.426	18.250	28.064	2.147	3.071	16.571	28.356	2.115	2.500	11.625
10.0	25.221	1.717	3.153	18.250	25.020	1.739	2.873	16.571	25.331	1.706	2.329	11.625
12.5	23.381	1.497	2.917	18.250	23.359	1.539	2.649	16.571	23.758	1.512	2.136	11.625
15.0	22.200	1.358	2.741	18.250	22.251	1.406	2.499	16.571	22.709	1.382	2.008	11.625
17.5	21.630	1.267	2.658	18.250	21.426	1.300	2.376	16.552	21.940	1.281	1.907	11.625
20.0	21.298	1.201	2.611	18.250	20.806	1.221	2.285	16.534	21.363	1.205	1.831	11.589
22.5	21.035	1.152	2.573	18.213	20.364	1.163	2.212	16.498	20.958	1.150	1.771	11.552
25.0	20.823	1.114	2.541	18.177	20.010	1.117	2.153	16.461	20.635	1.106	1.722	11.516
27.5	20.653	1.082	2.520	18.140	19.822	1.080	2.111	16.425	20.475	1.073	1.685	11.479
30.0	20.512	1.055	2.503	18.104	19.665	1.050	2.076	16.388	20.342	1.045	1.655	11.443
32.5	20.526	1.028	2.496	18.067	19.702	1.023	2.061	16.352	20.405	1.019	1.640	11.370
35.0	20.561	1.005	2.492	18.031	19.734	0.999	2.049	16.315	20.459	0.997	1.627	11.333
37.5	20.901	0.989	2.512	18.031	20.084	0.983	2.067	16.315	20.841	0.982	1.639	11.333
40.0	21.219	0.974	2.535	18.031	20.390	0.969	2.083	16.315	21.176	0.970	1.650	11.333
42.5	21.574	0.961	2.575	18.031	20.752	0.956	2.119	16.315	21.563	0.958	1.675	11.333
45.0	21.930	0.949	2.625	18.031	21.075	0.944	2.151	16.315	21.908	0.947	1.696	11.333
47.5	22.299	0.938	2.686	18.031	21.450	0.933	2.206	16.315	22.301	0.936	1.730	11.333
50.0	22.694	0.928	2.770	18.031	21.787	0.923	2.255	16.315	22.654	0.927	1.761	11.333
52.5	23.078	0.919	2.858	18.031	22.174	0.914	2.333	16.315	23.053	0.918	1.809	11.333
55.0	23.528	0.912	2.993	18.031	22.526	0.906	2.403	16.315	23.415	0.910	1.853	11.333
57.5	23.974	0.907	3.145	18.031	22.941	0.901	2.513	16.315	23.822	0.904	1.918	11.333
60.0	24.449	0.903	3.335	18.031	23.321	0.896	2.613	16.315	24.195	0.898	1.978	11.333
62.5	24.581	0.902	3.388	18.031	23.757	0.892	2.766	16.315	24.613	0.893	2.069	11.333
65.0	24.713	0.901	3.441	18.031	24.160	0.888	2.908	16.315	24.999	0.888	2.152	11.333

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors

Sussex County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	50.599	6.670	4.905	NA	53.811	7.344	3.579	NA	54.378	7.415	3.289	NA
5.0	34.851	3.105	4.474	NA	34.321	2.958	3.156	NA	34.560	2.979	2.888	NA
7.5	28.269	2.153	3.975	NA	28.230	2.139	2.787	NA	28.420	2.152	2.543	NA
10.0	24.925	1.734	3.683	NA	25.185	1.730	2.603	NA	25.350	1.738	2.370	NA
12.5	23.044	1.512	3.426	NA	23.561	1.532	2.394	NA	23.743	1.540	2.176	NA
15.0	21.823	1.371	3.233	NA	22.478	1.400	2.255	NA	22.671	1.408	2.047	NA
17.5	21.204	1.276	3.133	NA	21.677	1.296	2.144	NA	21.886	1.305	1.945	NA
20.0	20.828	1.208	3.070	NA	21.077	1.218	2.060	NA	21.297	1.228	1.868	NA
22.5	20.529	1.156	3.020	NA	20.652	1.162	1.993	NA	20.882	1.172	1.807	NA
25.0	20.288	1.116	2.979	NA	20.312	1.116	1.940	NA	20.551	1.128	1.758	NA
27.5	20.095	1.081	2.952	NA	20.136	1.081	1.900	NA	20.383	1.093	1.721	NA
30.0	19.935	1.052	2.931	NA	19.990	1.052	1.867	NA	20.243	1.064	1.690	NA
32.5	19.930	1.025	2.923	NA	20.038	1.025	1.853	NA	20.298	1.038	1.676	NA
35.0	19.948	1.001	2.918	NA	20.080	1.002	1.840	NA	20.346	1.015	1.663	NA
37.5	20.264	0.983	2.943	NA	20.444	0.987	1.856	NA	20.719	1.000	1.676	NA
40.0	20.561	0.968	2.971	NA	20.763	0.973	1.869	NA	21.046	0.987	1.688	NA
42.5	20.898	0.954	3.021	NA	21.137	0.961	1.899	NA	21.427	0.975	1.713	NA
45.0	21.237	0.941	3.083	NA	21.470	0.950	1.926	NA	21.766	0.964	1.735	NA
47.5	21.593	0.930	3.161	NA	21.852	0.939	1.971	NA	22.153	0.953	1.771	NA
50.0	21.977	0.919	3.267	NA	22.197	0.929	2.011	NA	22.502	0.943	1.804	NA
52.5	22.353	0.910	3.380	NA	22.589	0.920	2.074	NA	22.897	0.935	1.855	NA
55.0	22.804	0.904	3.554	NA	22.946	0.912	2.131	NA	23.257	0.927	1.901	NA
57.5	23.254	0.899	3.748	NA	23.361	0.907	2.219	NA	23.682	0.922	1.970	NA
60.0	23.740	0.895	3.994	NA	23.741	0.901	2.299	NA	24.073	0.918	2.034	NA
62.5	23.874	0.894	4.063	NA	24.173	0.897	2.422	NA	24.511	0.914	2.130	NA
65.0	24.008	0.893	4.132	NA	24.572	0.894	2.535	NA	24.915	0.911	2.219	NA

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors
NA-Not Applicable

Warren County
Emission Factors in Grams per Vehicle per Mile

Speed	Freeway				Arterial				Local			
	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5	CO	VOC	NOX	PM2.5
2.5	50.813	6.255	6.174	NA	56.202	7.100	3.626	NA	56.818	7.157	3.107	NA
5.0	35.706	3.005	5.680	NA	36.322	2.908	3.212	NA	36.544	2.876	2.731	NA
7.5	29.173	2.115	5.119	NA	30.082	2.114	2.847	NA	30.353	2.081	2.406	NA
10.0	25.826	1.720	4.790	NA	26.962	1.717	2.664	NA	27.257	1.683	2.243	NA
12.5	23.851	1.501	4.491	NA	25.291	1.522	2.456	NA	25.660	1.494	2.061	NA
15.0	22.543	1.360	4.264	NA	24.177	1.392	2.317	NA	24.596	1.367	1.939	NA
17.5	21.824	1.262	4.128	NA	23.353	1.289	2.206	NA	23.819	1.268	1.843	NA
20.0	21.360	1.190	4.036	NA	22.735	1.212	2.122	NA	23.236	1.194	1.772	NA
22.5	20.991	1.135	3.962	NA	22.296	1.156	2.056	NA	22.828	1.141	1.715	NA
25.0	20.692	1.091	3.902	NA	21.945	1.112	2.002	NA	22.502	1.099	1.669	NA
27.5	20.454	1.054	3.863	NA	21.762	1.077	1.963	NA	22.342	1.066	1.635	NA
30.0	20.257	1.022	3.833	NA	21.609	1.048	1.931	NA	22.210	1.039	1.606	NA
32.5	20.217	0.993	3.825	NA	21.655	1.021	1.917	NA	22.277	1.014	1.592	NA
35.0	20.205	0.967	3.820	NA	21.695	0.998	1.906	NA	22.335	0.992	1.580	NA
37.5	20.482	0.948	3.855	NA	22.062	0.983	1.922	NA	22.729	0.979	1.592	NA
40.0	20.745	0.931	3.895	NA	22.383	0.970	1.937	NA	23.073	0.966	1.603	NA
42.5	21.054	0.917	3.966	NA	22.760	0.958	1.970	NA	23.472	0.955	1.626	NA
45.0	21.371	0.903	4.054	NA	23.096	0.947	1.998	NA	23.826	0.945	1.646	NA
47.5	21.708	0.891	4.166	NA	23.484	0.936	2.046	NA	24.229	0.934	1.678	NA
50.0	22.081	0.881	4.320	NA	23.832	0.927	2.088	NA	24.591	0.925	1.707	NA
52.5	22.448	0.871	4.483	NA	24.230	0.918	2.155	NA	24.999	0.917	1.751	NA
55.0	22.891	0.864	4.737	NA	24.592	0.910	2.216	NA	25.370	0.909	1.790	NA
57.5	23.340	0.858	5.022	NA	25.021	0.905	2.309	NA	25.788	0.903	1.849	NA
60.0	23.836	0.854	5.383	NA	25.414	0.900	2.394	NA	26.171	0.897	1.904	NA
62.5	23.973	0.853	5.483	NA	25.861	0.897	2.524	NA	26.599	0.892	1.984	NA
65.0	24.110	0.852	5.583	NA	26.274	0.893	2.644	NA	26.995	0.888	2.059	NA

Note: CO, VOC, and NOX = Daily factors, PM2.5 = Annual factors
NA- Not Applicable

APPENDIX C
Local Aid and Economic Development Projects in Highlands Counties

Federal Funded Projects in Highlands Counties

The following is a list of federal aid for projects located in the Highlands Counties (includes all seven counties with portions located in Highlands Region) through NJDOT, Division of Local Aid and Economic Development: These projects fall under two federally funded programs; Bikeways and Transportation Enhancements. They have been initiated to assist county and municipal governments and non-profit organizations to improve the efficiency and effectiveness of the state's transportation system. The Division of Local Aid and Economic Development administers these federal funds. The projects encourage investment in those areas that will yield the greatest mobility, have the least environmental impact and make the most cost-effective use of available resources.

FY 2005 Bicycle Program Grant Recipients in Highlands Counties

County	Municipality	Project Name	Approved $
Bergen	Bergenfield Borough	Memorial Field Bikeway (Section 2)	$150,000
Bergen	East Rutherford Borough	East Rutherford Bicycle Connector (Additional)	$20,000
Bergen	Garfield City	Passaic River Bikeway	$250,000
Bergen	Hackensack City	Hackensack Riverfront Walkway	$250,000
Bergen	North Arlington Borough	North Arlington Bikeway	$150,000
Somerset	Montgomery Township	School Link - Montgomery Pathways	$100,000
Warren	Greenwich Township	Greenwich Street Sidewalk, Phase II	$100,000

FY 2005/2006 Transportation Enhancement Grant Recipients in Highlands Counties

County	Municipality	Project Name	Approved $
Bergen	Teaneck Township	Ward Plaza at the Teaneck Armory -Streetscaping Improvements	$250,000
Hunterdon	High Bridge Borough	Historic High Bridge Train Station & Central Business District Enhancements	$200,000
Total Amount Granted :	**$450,000**		

State Funded Projects in the Highlands Counties

The State Aid Program is one method by which the Department of Transportation can work with county and municipal governments to improve the efficiency and effectiveness of the state's transportation system. The following is a list of state aid for projects located in the Highlands Counties (includes all seven counties with portions located in Highlands Region)

through NJDOT, Division of Local Aid and Economic Development: These projects fall under three state funded programs: Municipal Aid, County Aid and Centers of Place. They have been initiated to assist county and municipal governments and non-profit organizations to improve the efficiency and effectiveness of the state's transportation system. The projects encourage investment in those areas that will yield the greatest mobility, have the least environmental impact and make the most cost-effective use of available resources.

FY 2007 Grant Recipients of Municipal Aid Program

FY 2007 Municipal Aid Program Recipients

County	*Municipality*	*Project*	*Approved Funding*
Bergen			
	Allendale Borough	Park Avenue	$150,000.00
	Alpine Borough	Allison Road	$110,000.00
	Bergenfield Borough	Veterans Plaza (Additional)	$150,000.00
	Bogota Borough	Palisade Avenue (Section 3)	$150,000.00
	Carlstadt Borough	Washington Street	$150,000.00
	Cliffside Park Borough	Lafayette Avenue	$150,000.00
	Demarest Borough	Park Street	$55,000.00
	East Rutherford Borough	Maple Street, Madison Street, Ann Street and Elm Street/New Street	$150,000.00
	Edgewater Borough	Garden Place	$140,000.00
	Elmwood Park Borough	Boulevard (Section 5)	$150,000.00
	Englewood City	Jones Road	$150,000.00
	Fair Lawn Borough	River Road Safety	$25,000.00
	Fairview Borough	Jersey Avenue	$150,000.00
	Fort Lee Borough	Stillwell Avenue	$150,000.00
	Franklin Lakes Borough	Franklin Lakes Flash Warning Signs	$75,000.00
	Garfield City	Palisade Avenue (Section 4)	$150,000.00
	Hackensack City	Vreeland Avenue	$125,000.00
	Hasbrouck Heights Borough	Madison Avenue	$75,000.00
	Haworth Borough	Valley Road	$125,000.00
	Hillsdale Borough	Dwight Avenue	$150,000.00
	Leonia Borough	Broad Avenue (Section 5)	$135,000.00
	Lodi Borough	Arnot Street	$146,000.00
	Mahwah Township	Washington School Sidewalks	$90,000.00
	Maywood Borough	West Pleasant Avenue (Section 2) (Additional)	$150,000.00
	Midland Park Borough	Park Avenue (Section 2)	$150,000.00
	Montvale Borough	Mercedes Drive (Section 2)	$150,000.00

FY 2007 Municipal Aid Program Recipients

County	Municipality	Project	Approved Funding
	Moonachie Borough	Caesar Place (Section 3), State Street and Anderson Avenue (Section 3)	$150,000.00
	New Milford Borough	Boulevard (Section 3)	$150,000.00
	North Arlington Borough	Canterbury Avenue	$150,000.00
	Oakland Borough	Seton Hall Drive	$100,000.00
	Old Tappan Borough	Various Roads - 2007 - Old Tappan	$150,000.00
	Oradell Borough	Prospect Avenue (Additional)	$150,000.00
	Palisades Park Borough	East Palisade Boulevard (Section 2)	$150,000.00
	Paramus Borough	Century Road (Section 6)	$150,000.00
	Ramsey Borough	Elbert Street (Section 2)	$150,000.00
	Ridgefield Borough	Art Lane	$150,000.00
	Ridgefield Park Village	Main Street (Section 5)	$140,000.00
	Ridgewood Village	Oak Street	$140,000.00
	River Vale Township	Rivervale Road Sidewalks	$150,000.00
	Rutherford Borough	Mortimer Avenue	$150,000.00
	Saddle Brook Township	Oxford Avenue	$150,000.00
	South Hackensack Township	Vreeland Avenue (Section 2)	$150,000.00
	Teaneck Township	Fycke Lane (Section 2)	$140,000.00
	Tenafly Borough	Hudson Avenue	$140,000.00
	Teterboro Borough	Railroad Grade Crossings	$150,000.00
	Upper Saddle River Borough	Pleasant Avenue (Section 2)	$140,000.00
	Waldwick Borough	Lockwood Avenue	$125,000.00
	Woodcliff Lake Borough	Overlook Drive (Section 3)	$150,000.00
	Wood-Ridge Borough	Valley Boulevard (Section 2)	$150,000.00
	Wyckoff Township	Grandview Avenue (Section 2)	$150,000.00
Hunterdon			
	Clinton Town	Clinton Knolls Area Improvement	$150,000.00
	East Amwell Township	Spring Hill Road	$120,000.00
	Flemington Borough	Pennsylvania Avenue Section 1	$150,000.00
	Franklin Township	Hogback Road Section II	$150,000.00
	Glen Gardner Borough	Sanatorium Road Section 1	$90,000.00
	High Bridge Borough	Jerricho Road and Arch Street Section 2	$100,000.00
	Holland Township	Ellis Road Section 1	$150,000.00
	Kingwood Township	Oak Grove Road Section 1B	$71,000.00
	Lebanon Township	Dutch Hill Road	$125,000.00
	Milford Borough	Valley View and Hillside Avenue	$150,000.00
	Raritan Township	Reaville Avenue and Wellington Avenue - Yorkshire Drive Traffic Signal	$100,000.00
	Stockton Borough	Mill Street Section 2	$180,000.00
	Tewksbury Township	Bissell Road	$150,000.00

County	Municipality	Project	Approved Funding
Morris			
	Boonton Town	Vreeland Avenue	$175,000.00
	Boonton Township	Rockaway Valley Road & Storm Drainage	$175,000.00
	Butler Borough	West Belleview Avenue	$175,000.00
	Chatham Borough	Van Doren Avenue	$175,000.00
	Chatham Township	Hillside Avenue	$140,000.00
	Denville Township	Shongum Road	$70,000.00
	Dover Town	East McFarlan Street	$120,000.00
	East Hanover Township	River Road Section 1	$175,000.00
	Florham Park Borough	Elm Street	$140,000.00
	Hanover Township	Algonquin Parkway	$150,000.00
	Jefferson Township	Ridge Road	$175,000.00
	Kinnelon Borough	Fayson Lakes Road	$175,000.00
	Lincoln Park Borough	Beaver Brook Road Phase 1	$130,000.00
	Long Hill Township	Division Avenue/Valley Road Traffic Signal	$99,000.00
	Madison Borough	Green Avenue	$175,000.00
	Mendham Township	East Main Street	$140,000.00
Passaic			
	Bloomingdale Borough	Highland Avenue	$150,000.00
	Clifton City	Burgess Place and Summer Street	$258,000.00
	Haledon Borough	Summit Avenue	$115,000.00
	Hawthorne Borough	Brookside Avenue	$200,000.00
	Little Falls Township	Van Pelt Place	$200,000.00
	North Haledon Borough	Linda vista Avenue Section 2	$200,000.00
	Passaic City	Market Street	$322,000.00
	Paterson City	Signalized Intersection Upgrade	$400,000.00
	Pompton Lakes Borough	Locust Street, Laura Street, Ivy Street and Grove Street	$200,000.00
	Prospect Park Borough	Wagaraw Boulevard and North 12th Street	$220,000.00
	Ringwood Borough	Westbrook Road Section 6	$250,000.00
	Totowa Borough	Dewey Avenue Phase 1	$180,000.00
	Wanaque Borough	Laura Avenue Phase 1	$250,000.00
	Wayne Township	Kiwanis Drive	$250,000.00
	West Milford Township	Warwick Turnpike Section 9	$350,000.00
	West Paterson Borough	Hillcrest Avenue	$200,000.00

County	Municipality	Project	Approved Funding
Somerset			
	Bernards Township	Spring Valley Boulevard	$150,000.00
	Bernardsville Borough	Ballantine Road	$150,000.00
	Bound Brook Borough	Highland Place	$200,000.00
	Branchburg Township	Old York Road Phase II	$210,000.00
	Bridgewater Township	Crim Road	$128,000.00
	Franklin Township	Jacques Lane	$150,000.00
	Green Brook Township	Wimpole Way	$150,000.00
	HillsBorough Township	Wertsville Road	$150,000.00
	Manville Borough	South Washington Avenue	$190,000.00
	Montgomery Township	Spring Hill Road	$200,000.00
	North Plainfield Borough	Johnston Drive Extension	$150,000.00
	Raritan Borough	Loomis Street	$117,000.00
	Rocky Hill Borough	Grove Street	$47,000.00
	Somerville Borough	West Cliff Street Phase 2	$225,000.00
	South Bound Brook Borough	Prospect Street	$296,000.00
	Warren Township	Mountainview Road Phase 1	$200,000.00
	Watchung Borough	Johnston Drive	$200,000.00
Sussex			
	Andover Borough	Smith Street	$146,000.00
	Andover Township	Sky Top Road Section III	$150,000.00
	Byram Township	North Shore Road Phase II	$150,000.00
	Frankford Township	George Hill Road Section 1A	$150,000.00
	Franklin Borough	Scott Road	$130,000.00
	Green Township	Meadow Lane	$140,000.00
	Hampton Township	Mary Jones Road Section II	$150,000.00
	Hopatcong Borough	Hopatcong 2007 Road Resurfacing - Multiple Streets	$150,000.00
	Stanhope Borough	Elm Street Phase 1 (Valley Road School Route Imprs)	$140,000.00
	Stillwater Township	Mt. Benevolence Road Phase II	$150,000.00
	Vernon Township	Sandhill Road and Macpeek Road Phase I	$150,000.00
	Wantage Township	Blair Road Section III	$150,000.00
Warren			
	Allamuchy Township	Ridge Road	$140,000.00
	Belvidere Town	Hardwick Street	$140,000.00
	Franklin Township	Stewartsville Road	$150,000.00
	Frelinghuysen Township	State Park Road	$140,000.00
	Harmony Township	Montana Road Phase 1 Drainage	$96,000.00
	Hope Township	Nightingale Road Section 2	$50,000.00
	Independence Township	Russling Road	$145,000.00
	Knowlton Township	Auble Road Section 2	$85,000.00
	Liberty Township	Marble Hill Road	$140,000.00
	Pohatcong Township	Liggett Boulevard	$150,000.00

FY 2006 Allotments of County Aid

County	Allocation
Bergen	$7,181,000
Hunterdon	$1,273,000
Morris	$3,488,000
Passiac	$3,791,000
Somerset	$2,076,000
Sussex	$1,574,000
Warren	$1,276,000
Total Amount Granted:	**$20,659,000**

FY 2006 Grants Recipients of Local Aid for Centers of Place in Highlands Counties

County	Municipality	Project Description	Approved $
Passaic	Paterson City	Main and Market Street Beautification	$100,000
Sussex	Sandyston Township	County Route 560 Streetscape Improvements	$119,500
Total Amount Granted:	**$219,500**		

APPENDIX D

Transportation Improvement Program

Transportation Improvement Program - Highlands Counties

The NJTPA's Transportation Improvement Program (TIP) is a four-year schedule of transportation improvements for which planning has been completed. These are projects that are ready for, or in the process of, final engineering design, right-of-way acquisition or construction. Projects in the TIP involve the use of federal, state, and other funds. It is used as a reference by NJDOT, other implementing agencies and all those interested in transportation issues in the state. It also serves as a reference required under federal regulations for use by the Federal Highway Administration and the Federal Transit Administration for the approval of federal funds to transportation projects in New Jersey:

The following list developed by NJTPA includes transportation improvements planned in the Highlands Counties (includes all seven counties with portions located in Highlands Region) for fiscal years 2007-2010:

NJTPA Transportation Improvement Program Fiscal Years 2007 - 2010
Highway and Bridge Project Summary by Subregion

($ Millions)

Project	DBNUM	FY 2007 PHASE	FY 2007 COST	FY 2008 PHASE	FY 2008 COST	FY 2009 PHASE	FY 2009 COST	FY 2010 PHASE	FY 2010 COST	Page
Bergen County Projects										
Market Street/Essex Street/Rochelle Avenue	98546	CON	3.84							1
Route 17 at Passaic Street, Roadway Improvements	NS9601	ROW	5.40					CON	15.40	2
Rte. 1&9 Sec. NYS&W RR Bridge (23) Mile posts: 60.56 - 61.10	9240			CON	23.60					3
Rte. 1&9 Sec. Secaucus Road to Broad Avenue (28) Mile posts: 56.80 - 63.00	X207	CON	25.94							4
Rte. 3 Sec. Passaic River Crossing Mile posts: 3.83 - 6.36	799	UTI	10.00	CON	36.44	CON	46.45	CON	127.72	5
Rte. 3 Sec. Route 120 Southbound to Route 3 Eastbound Ramp Mile posts: 8.0 - 8.30	04326A	ERC	2.10	ERC	17.50					6
Rte. 5 Sec. Bergen County, Drainage Improvements Mile posts: 2.17 - 3.15	94032	DES ROW	0.60 0.40			CON	3.90			7
Rte. 5 Sec. Bridges, Palisades Park Mile posts: 0.38 - 0.90	98353	CON	14.17							8
Rte. 9W Sec. Improvements at I-95/Rt. 4 Mile posts: 0.1 - 0.16	95013	CON	2.95	CON	1.05					9
Rte. 17 Sec. Bergen County Intersection Improvements Mile posts: 4.48 - 5.40; 7.44 - 8.59	04326D	ROW UTI	0.20 1.25	CON	12.50					10
Rte. 17 Sec. Essex Street Bridge (3) Mile posts: 9.90 - 10.40	9105	CON	15.74	CON	19.73					11
Rte. 17 Sec. NYS&W Bridge Mile posts: 10.90	94057	FA	1.05							12
Rte. 17 Sec. Railroad Avenue, Drainage Improvements Mile posts: 4.93	93174	DES ROW	0.33 0.32			CON	2.20			13
Rte. 17 Sec. Route 120 (Paterson Plank Road) to Garden State Parkway Mile posts: 5.76 - 13.60	103A	FA	1.38	FA	2.80	PD	11.20			14
Rte. 46 Sec. Fifth Street/Jefferson Avenue Mile posts: 65.40 - 65.90	93279	ROW	0.50	CON	3.91					15
Rte. 46 Sec. Little Ferry Circle, Operational and Safety Improvements Mile posts: 69.90 - 70.10	93287	ROW	6.00			CON	8.10			16
Rte. 46 Sec. Main Street, Lodi Mile posts: 66.65 - 66.66	93281			CON	16.28	CON	13.82			17
Rte. 93 Sec. Leonia Boro, Drainage Improvements Mile posts: 1.70 - 2.60	93179	CON	6.03							18
Rte. 120 Sec. Paterson Plank Road from Route 17 to Murray Hill Boulevard Mile posts: 1.58 - 2.60	04326B	DES ROW UTI	1.50 3.00 0.63			CON	27.85			19
Rte. 208 Sec. Serafin Place to Boulevard, Drainage Improvements Mile posts: 3.20 - 3.50	05389			CON	0.90					20
Hunterdon County Projects										
Reformatory Road Bridge (C-88) over Beaver Brook	NS0010	DES	0.24	ROW	0.20	CON	1.20			1
Rockafellows Mill Road Bridge over South Branch of Raritan River (RQ-164)	NS0105	DES	0.23			ROW	0.08	CON	1.10	2
Wertsville Road Bridge (E-166) over Back Brook Mile posts: 1.05 & Rte. CR 602	NS9907			ROW	0.13	CON	2.75			3
Wertsville Road Bridge (E-174) over Tributary of Back Brook Mile posts: 0.96 & Rte. CR 602	NS9906			ROW	0.10	CON	2.90			4

Project *(Hunterdon continued)*	DBNUM	($ Millions) FY 2007 PHASE	COST	FY 2008 PHASE	COST	FY 2009 PHASE	COST	FY 2010 PHASE	COST	Page
Rte. 29 Sec. Lambertville Gateways Mile posts: 18.20 - 19.90 & Rte. 179	00362A	PD	0.30							5
Rte. 29 Sec. West Amwell Twp., Drainage (Sheet Flow) Mile posts: 17.15 - 18.20	93166	CON	2.25							6
Rte. 31 Sec. Flemington Area Congestion Mitigation Mile posts: 22.02 - 25.30	403A	PD	2.20							7
Rte. 31 Sec. Raritan Valley Line Bridge Replacement and Operational Improvements (8P) Mile posts: 37.40 - 39.40	9102			ROW	3.82	CON	16.01			8
Rte. 78 Sec. East of Tunnel Road to East of Beaver Brook, Resurfacing Mile posts: 10.00 - 18.00	05398			CON	18.38					9
Rte. 78 Sec. Edna Mahan Frontage Road Mile posts: 15.00 - 15.40	9137A	DES	1.00	CON	7.18					10
Rte. 78 Sec. Pittstown Road (Exit 15), Interchange Improvements Mile posts: 16.06 - 16.10 & Rte. CR 513	NS0309	LPD	0.48							11
Morris County Projects										
Boonton Rail Yard	06400	EC	0.30							1
Eden Lane Bridge over Whippany River	NS9908	CON	3.52							2
Green Pond Road Bridge over Hibernia Brook	NS0008			ROW	0.35	CON	3.10			3
Inamere Road Bridge over Whippany River	NS0007	CON	2.90							4
Long Valley Safety Project	NP0301	LPD	0.48							5
NY Susquehanna and Western Rail Line Bicycle/Pedestrian Path	NS9803	DES	1.50			ROW	2.00			6
Paterson Hamburg Turnpike Over Pequannock River	N9910	ROW	0.20	CON	3.30					7
South Salem Street Bridge over NJT Morristown Line	98340	CON	11.02							8
Troy Road over Whippany River	02366			CON	2.70					9
Rte. 10 Sec. Powder Mill Road Mile posts: 9.55 - 10.04	00344	CON	5.57							10
Rte. 10 Sec. Route 10/53 Interchange (2L 3J) Mile posts: 10.40 - 10.90 & Rte. 53	089	ROW	0.98	CON	2.54	CON	10.50			11
Rte. 24 Sec. I-287 Interchange to West of Route 124 Interchange, Resurfacing Mile posts: 0 - 6.8	04382	CON	12.60							12
Rte. 46 Sec. Franklin Road Pedestrian Improvements Mile posts: 42.30 - 42.70	99300	CON	5.47							13
Rte. 46 Sec. Main Street, Netcong Mile posts: 29.95	97115	ROW	0.60	CON	2.14					14
Rte. 46 Sec. Rockaway River; NJ TRANSIT Bridges (7L 8K) Mile posts: 37.90 - 38.30	224			CON	21.17	CON	19.91			15
Rte. 80 Sec. I-80/I-287 Safety Improvement Mile posts: Route 80: 43.56 - 43.76; Route 287: 41.5 - 42.5 & Rte. 287	00371A	ROW	0.05			CON	10.50			16
Rte. 80 Sec. Parsippany-Troy Hills Roadway Improvement Mile posts: Route 80: 41.50 - 45.60; Route 287: 41.50 - 41.80	00371B			ROW	0.45			CON	63.80	17
Rte. 80 Sec. Rockfall Mitigation, Roxbury Township Mile posts: 29.30 - 29.50	01362	DES ROW	0.40 0.50			CON	6.25			18
Passaic County Projects										
Barclay Street Viaduct	NS9807	CON	3.50							1
Hazel Street Reconstruction Mile posts: 0 - 0.66 & Rte. CR 702	NS9310	CON	4.20							2
NY Susquehanna and Western Rail Line Bicycle/Pedestrian Path	NS9803	DES	1.50			ROW	2.00			3

Project *(Passaic continued)*	DBNUM	($ Millions) FY 2007 PHASE	COST	FY 2008 PHASE	COST	FY 2009 PHASE	COST	FY 2010 PHASE	COST	Page
Paterson Hamburg Turnpike Over Pequannock River	N9910	ROW	0.20	CON	3.30					4
Rte. 3 Sec. Passaic River Crossing Mile posts: 3.83 - 6.36	799	UTI	10.00	CON	36.44	CON	46.45	CON	127.72	5
Rte. 3 Sec. Valley Road and Notch/Rifle Camp Road Interchange Mile posts: Rt. 3: 0 - 0.50; Rt. 46: 59.2 - 60.3 & Rte. 46	059	DES	8.00			ROW	8.00			6
Rte. 21 Fwy Sec. Route 3 Interchange, Safety Improvements Mile posts: 9.10 - 10.00	93221A	DES	0.20	CON	1.30					7
Rte. 23 Sec. Long-term Interchange Improvements Mile posts: 23: 5.1-5.7; 80: 52.8-53.75 & Rte. 80	9233B6	FA	0.48	PD	0.48					8
Rte. 46 Sec. Passaic Avenue to Willowbrook Mall Mile posts: 54.96 - 55.56	9233B3	DES	0.40	CON	2.93	CON	2.00			9
Rte. 46 Sec. Route 23 & 80 Interchange Improvements (43) Mile posts: 55.80 - 56.70 & Rte. 80/23	9116	CON	13.00							10
Rte. 80 Sec. Squirelwood Road Mile posts: 56.76 - 57.47	9022	CON	0.94							11

Somerset County Projects

Amwell Road Bridge over Neshanic River	L002			CON	3.81					1
Geraud Avenue Bridge over Green Brook	NS9904					CON	1.50			2
South Main Street/Finderne Avenue Bridge over Raritan River Mile posts: 29.19 - 29.26 & Rte. CR 533	NS0003	CON	10.10							3
Studdiford Drive Bridge over South Branch of Raritan River, Replacement Mile posts: 0.03 & Rte. CR 606	NS0411			CON	5.00					4
Rte. 22 Sec. Chimney Rock Road Interchange Improvements Mile posts: 37.13	98542	CON	13.32	CON	19.18					5
Rte. 22 Sec. Crab Brook, Drainage Improvements Mile posts: 45.25	93151			CON	10.55					6
Rte. 22 Sec. Park Avenue/Bonnie Burn Road Mile posts: 47.15 - 47.55	9189			ROW	2.57	CON	15.46			7
Rte. 22 Sec. Sustainable Corridor Short-term projects Mile posts: 33.88 - 37.14	03319	DES ROW	1.00 0.98	CON	2.95	CON	5.40			8
Rte. 27 Sec. Renaissance 2000, Bennetts Lane to Somerset Street Mile posts: 13.10 - 15.17	97079	DES	1.00	ROW	1.50	CON	9.50			9
Rte. 27 Sec. Six Mile Run Bridge (3E) Mile posts: 11.45 - 11.65	146	ROW	0.30	CON	3.05					10
Rte. 78 Sec. Drift Road to Route 124, Rehabilitation Mile posts: 42.20 - 50.60	04349			CON	20.65					11
Rte. 78 Sec. Westbound Acceleration Lane from I-287 Southbound Mile posts: 30.10 - 30.50	04389A	CON	3.40							12
Rte. 202 Sec. Somerset/Morris Drainage Improvements (3 locations) Mile posts: 32.95; 36.50; 43.20	93164A1			CON	3.86					13
Rte. 206 Sec. Crusers Brook Bridge (41) Mile posts: 61.80	94060			CON	8.32					14
Rte. 206 Sec. CSX Bridge Replacement Mile posts: 62.3 - 62.9	94059			CON	17.49					15
Rte. 206 Sec. Old Somerville Road to Brown Avenue (15N) Mile posts: 66.20 - 68.40	780			UTI	29.90			CON	45.30	16
Rte. 206 Sec. Wetland Preservation, Somerset	02348	ROW	2.50							17
Rte. 206 Bypass Sec. Belle Mead-Griggstown Road to Old Somerville Road (14A 15A) Mile posts: 62.20 - 66.30	779			CON	21.00	CON	55.80	CON	61.90	18

($ Millions)

Project *(Somerset continued)*	DBNUM	FY 2007 PHASE	FY 2007 COST	FY 2008 PHASE	FY 2008 COST	FY 2009 PHASE	FY 2009 COST	FY 2010 PHASE	FY 2010 COST	Page
Sussex County Projects										
Sparta Stanhope Road Bridge (Sussex County Bridge K-07) over Lackawanna Cutoff	L001	CON	9.67							1
Sussex County Route 605 Connector & Rte. CR 605	NS9911	LPD	0.48							2
Rte. 15 Sec. Wilson Drive and White Lake Road, Intersection Improvements Mile posts: 15.40 - 15.48	97120P	ROW	0.60	CON	1.90					3
Rte. 23 Sec. Hardyston Twp., Silver Grove Road to Holland Mountain Road Mile posts: 26.80 - 31.80	96039	ROW	3.75			CON	31.13			4
Rte. 23 Sec. Linwood Avenue to Walkill Avenue (7D 8C) Mile posts: Rt 23: 35.37-35.56; Rt. 94: 35.51-35.71 & Rte. 94	8919	CON	4.60							5
Rte. 23 Sec. Sussex Borough Realignment & Papakating Creek Bridge Mile posts: 38.98 - 40.18	9044	DES ROW	1.51 6.50			CON	28.00			6
Rte. 181 Sec. Green Road, Drainage Improvements Mile posts: 2.40	98402	CON	0.77							7
Rte. 206 Sec. Waterloo/Brookwood Roads Mile posts: 98.38 - 99.70 & Rte. CR 604	407A			CON	18.80					8
Warren County Projects										
Brass Castle Road Bridge over Pohatcong Creek & Rte. CR 623	NS9905			CON	0.95					1
Cemetery Road Bridge over Pequest River	NS9314			ROW	0.05			CON	1.00	2
Rte. 57 Sec. Corridor Scenic Preservation Mile posts: 0 - 21.10	97062A	ERC	1.00	ERC	1.00	ERC	1.00	ERC	1.00	3
Rte. 57 Sec. CR 519 Intersection Improvement Mile posts: 1.30 - 1.70 & Rte. CR 519	97062B	PD	1.30							4
Rte. 80 Sec. East of Delaware River to West of Knowlton Road, Resurfacing Mile posts: 0.80 - 8.00	05396	CON	16.50							5
Rte. 80 Sec. Rockfall Mitigation, Allamuchy Township Mile posts: 21.90	05348	ERC	0.70							6
Rte. 94 Sec. Yard's Creek Bridge Mile posts: 3.00 - 3.20	9371	CON	2.48							7

NJTPA Transportation Improvement Program Fiscal Years 2007 - 2010
Highway and Bridge Regionwide Projects and Programs Summary

($ Millions)

Project	DBNUM	FY 2007 PHASE	FY 2007 COST	FY 2008 PHASE	FY 2008 COST	FY 2009 PHASE	FY 2009 COST	FY 2010 PHASE	FY 2010 COST	Page
Accident Reduction Program	X242	EC	1.66	EC	1.75	EC	2.62	EC	2.70	1
Bridge Deck Replacement Program	03304	EC	20.97	EC	8.00	EC	8.00	EC	8.00	1
Bridge Inspection, Local Bridges	X07E	EC	5.75	EC	3.97	EC	6.26	EC	4.32	2
Bridge Inspection, State NBIS Bridges	X07A	EC	10.45	EC	7.88	EC	11.37	EC	8.57	2
Bridge Painting Program	X08	EC	12.32	EC	14.00	EC	14.00	EC	14.00	3
Emergency Service Patrol	X181	EC	4.80	EC	4.80	EC	4.80	EC	4.80	3
ITS Coalition Funding	00376	EC	1.76	EC	1.29	EC	1.26	EC	1.00	4
Local CMAQ Initiatives	X065	EC	1.00	EC	1.00	EC	1.00	EC	1.00	4
Local County Aid, NJTPA	X41B1	ERC	53.86	ERC	53.86	ERC	53.86	ERC	53.86	5
Local Municipal Aid, NJTPA	X98B1	ERC	53.85	ERC	53.85	ERC	53.85	ERC	53.85	5
Local Safety Program	04314	ERC	1.00	ERC	2.00	ERC	2.00	ERC	2.00	6
Metropolitan Planning	X30A	PLS	11.72	PLS	12.08	PLS	12.40	PLS	12.40	6
NJTPA Project Development	X80A	LPD	2.00	LPD	2.00	LPD	2.00	LPD	2.00	7
NJTPA, Future Projects	N063	ERC	1.78	ERC	3.53	ERC	8.99	ERC	27.28	7
Project Development, Preliminary Design	99321	PD	15.00	PD	15.00	PD	15.00	PD	15.00	8
Rail-Highway Grade Crossing Program, Federal	X35A1	EC	2.20	EC	2.20	EC	2.40	EC	2.60	8
Restriping Program	X03A	EC	6.20	EC	6.20	EC	6.20	EC	6.20	9
Sign Structure Repair, Contract 1	X239A1	CON	2.13							9
STAR: Station Revitalization Program	02381	EC	1.00	EC	1.00	EC	1.00	EC	1.00	10
TMA-NJTPA	X43K	EC	3.70	EC	3.30	EC	3.30	EC	3.30	10
Traffic Operations Center (North)	X99	EC	5.50	EC	5.50	EC	5.50	EC	5.50	11
Traffic Operations Center (South)	X82	EC	0.60	EC	0.60	EC	0.60	EC	0.60	11
Train Preemption for Traffic Signals - North II	02354			CON	4.46					12
TRANSCOM Traffic and Incident Management	X125	EC	0.50	EC	0.50	EC	0.50	EC	0.50	12

NJTPA Transportation Improvement Program Fiscal Year 2007 - 2010
Highway and Bridge Statewide Programs Summary

($ Millions)

Programs	DBNUM	FY 2007 PHASE	COST	FY 2008 PHASE	COST	FY 2009 PHASE	COST	FY 2010 PHASE	COST	Page
Advance Acquisition of Right of Way	X12	ROW	2.50	ROW	2.50	ROW	2.50	ROW	2.50	1
Airport Safety Fund	X02	ERC	5.40	ERC	7.00	ERC	7.00	ERC	7.00	1
Asbestos Surveys and Abatements	04311	DES	1.00	DES	1.00	DES	1.00	DES	1.00	2
Betterments, Bridge Preservation	X72A	EC	14.00	EC	14.00	EC	14.00	EC	14.00	2
Betterments, Roadway Preservation	X72B	EC	9.00	EC	9.00	EC	9.00	EC	9.00	3
Betterments, Safety	X72C	EC	6.00	EC	6.00	EC	6.00	EC	6.00	3
Bicycle & Pedestrian Facilities/Accommodations	X185	ERC	5.00	ERC	5.00	ERC	5.00	ERC	5.00	4
Bridge Deck Patching Program	06385	EC	5.00	EC	5.00	EC	5.00	EC	5.00	4
Bridge Management System	X70	EC	0.24	EC	0.24	EC	0.24	EC	0.24	5
Bridge Safety, Movable Bridge Repair	06388	EC	5.00	EC	5.00	EC	5.00	EC	5.00	5
Bridge Scour Countermeasures	98316	ERC	4.30	ERC	4.30	ERC	4.30	ERC	4.30	6
Bridge, Emergency Repair	98315	EC	20.00	EC	20.00	EC	20.00	EC	20.00	6
Capital Contract Payment Audits	98319	EC	0.45	EC	0.45	EC	0.45	EC	0.45	7
Clean Cities Program	X190	EC	0.50							7
Congestion Relief, Intelligent Transportation System Improvements (Smart Move Program)	02379	EC	5.00	EC	5.00	EC	5.00	EC	5.00	8
Congestion Relief, Operational Improvements (Fast Move Program)	02378	EC	10.00	EC	10.00	EC	10.00	EC	10.00	8
Construction Inspection	X180	EC	4.00	EC	4.00	EC	4.00	EC	4.00	9
Construction Program IT System (TRNS.PORT)	05304	EC	2.50	EC	0.50	EC	0.50	EC	0.50	9
Culvert Inspection Program, Locally-owned Structures	99322A	EC	2.60	EC	2.60	EC	2.60	EC	2.60	10
Culvert Inspection Program, State-owned Structures	99322	EC	0.65	EC	0.65	EC	0.65	EC	0.65	10
Dams, Betterments	01335	EC	0.20	EC	0.20	EC	0.20	EC	0.20	11
DBE Supportive Services Program	X142	EC	0.50	EC	0.50	EC	0.50	EC	0.50	11
Design, Emerging Projects	X106	DES	9.60	DES	6.60	DES	6.60	DES	6.60	12
Design, Geotechnical Engineering Tasks	05342			DES	0.30			DES	0.30	12
Disadvantaged Business Enterprise	X197	EC	0.10	EC	0.10	EC	0.10	EC	0.10	13
Drainage Rehabilitation and Maintenance, State	X154	EC	2.00	EC	2.00	EC	2.00	EC	2.00	13
Drainage Rehabilitation, Federal	X154D	EC	3.00	EC	3.00	EC	3.00	EC	3.00	14
Electrical and Signal Safety Engineering Program	X147			EC	0.25			EC	0.25	14
Electrical Facilities	X241	EC	1.50	EC	1.50	EC	1.50	EC	1.50	15
Electrical Load Center Replacement, Statewide	04324	ERC	2.00	ERC	2.00	ERC	2.00	ERC	2.00	15
Environmental Document Development	03309	PD	0.50	PD	0.50	PD	0.50	PD	0.50	16
Environmental Investigations	X75	EC	3.15	EC	3.15	EC	3.15	EC	3.15	16

Programs *(Statewide continued)*	DBNUM	($ Millions) FY 2007 PHASE	COST	FY 2008 PHASE	COST	FY 2009 PHASE	COST	FY 2010 PHASE	COST	Page
Equipment (Safety-Related Equipment)	04332	EC	2.00	EC	2.00	EC	2.00	EC	2.00	17
Equipment (Vehicles & Construction Equipment)	X15	EC	3.50	EC	3.50	EC	3.50	EC	3.50	17
Equipment, Over-age Reduction Program	99331	EC	2.00	EC	2.00	EC	2.00	EC	2.00	18
Ferry Program	00377	ERC	10.00	ERC	10.00	ERC	10.00	ERC	10.00	18
Freight Program	X34	EC	10.38	EC	10.13	EC	10.13	EC	10.00	19
Historic Bridge Preservation Program	X236	CON	0.50	CON	0.50	CON	0.50	CON	0.50	19
Intelligent Transportation Systems	03305	ERC	1.50	ERC	1.50	ERC	1.50	ERC	1.50	20
Intersection Improvement Program	98333	ERC	1.00	ERC	1.00	ERC	1.00	ERC	1.00	20
Interstate Service Facilities	X151	EC	0.25	EC	0.25	EC	0.25	EC	0.25	21
Legal Costs for Right of Way Condemnation	X137	EC	1.60	EC	1.60	EC	1.60	EC	1.60	21
Local Aid for Centers of Place	X161	EC	2.00	EC	2.00	EC	2.00	EC	2.00	22
Local Aid Grant Management System	06327	EC	1.00	EC	0.10	EC	0.10	EC	0.10	22
Local Aid, Discretionary	X186	ERC	17.50	ERC	17.50	ERC	17.50	ERC	17.50	23
Local Municipal Aid, Urban Aid	X98Z	ERC	5.00	ERC	5.00	ERC	5.00	ERC	5.00	23
Local Scoping Support	06326	PD	0.50	PD	0.50	PD	0.50	PD	0.50	24
Maintenance Management System	X196	EC	1.00	EC	1.00	EC	1.00	EC	1.00	24
Maritime Transportation System	01309	EC	3.00	EC	3.00	EC	3.00	EC	3.00	25
Median Crossover Crash Prevention Program	03316	EC	7.00	EC	7.00	EC	7.00	EC	7.00	25
Motor Vehicle Crash Record Processing	X233	EC	3.00	EC	3.00	EC	3.00	EC	3.00	26
National Boating Infrastructure Grant Program	01342	EC	1.60	EC	1.60	EC	1.60	EC	1.60	26
Orphan Bridge Reconstruction	99372	EC	6.50	EC	4.50	EC	4.50	EC	4.50	27
Park and Ride/Transportation Demand Management Program	X28B	EC	9.50	EC	9.50	EC	9.50	EC	9.50	27
Pavement Management System	X69	EC	4.00	EC	4.00	EC	4.00	EC	4.00	28
Pavement Preservation	X51	EC	3.00	EC	3.00	EC	3.00	EC	3.00	28
Physical Plant	X29	ERC	6.00	ERC	6.00	ERC	6.00	ERC	6.00	29
Planning and Research, Federal-Aid	X30	PLS	17.78	PLS	18.48	PLS	18.68	PLS	18.68	29
Planning and Research, State	X140	PLS	3.00	PLS	3.00	PLS	3.00	PLS	3.00	30
Pre-Apprenticeship Training Program for Minorities and Females	X135	EC	0.50	EC	0.50	EC	0.50	EC	0.50	30
Program implementation costs, NJDOT	X10	EC	85.00	EC	85.00	EC	85.00	EC	85.00	31
Project Development, Feasibility Assessment	X32	FA	11.25	FA	11.25	FA	11.25	FA	11.25	31
Project Enhancements	05341	EC	0.20	EC	0.20	EC	0.20	EC	0.20	32
Quality Assurance	00351	EC	1.50	EC	1.50	EC	1.50	EC	1.50	32
Rail Grade Crossing Technologies, Demonstration Project	01328A	EC	0.10	EC	0.10	EC	0.10	EC	0.10	33
Rail-Highway Grade Crossing Program, State	X35A	CON	2.20	CON	2.20	CON	2.20	CON	2.20	33
Real-time Traveler Information	05343	EC	1.00	EC	1.00	EC	1.00	EC	1.00	34

($ Millions)

Programs *(Statewide continued)*	DBNUM	FY 2007 PHASE	FY 2007 COST	FY 2008 PHASE	FY 2008 COST	FY 2009 PHASE	FY 2009 COST	FY 2010 PHASE	FY 2010 COST	Page
Recreational Trails Program	99409	ERC	1.22	ERC	1.26	ERC	1.28	ERC	1.28	34
Regional Action Program	X144	EC	2.00	EC	2.00	EC	2.00	EC	2.00	35
Resurfacing Program	X03E	EC	60.00	EC	60.00	EC	80.00	EC	90.00	35
Right of Way Database/Document Management System	05339	EC	0.10	EC	0.10	EC	0.10	EC	0.10	36
Right of Way Full-Service Consultant Term Agreements	05340	ROW	0.30	ROW	0.30	ROW	0.30	ROW	0.30	36
Rutgers Transportation Safety Resource Center	04364	EC	1.30	EC	1.30	EC	1.30	EC	1.30	37
Safe Corridors Program	04313	ERC	2.50	ERC	2.50	ERC	2.50	ERC	2.50	37
Safe Routes to Schools Program	99358	ERC	2.54	ERC	2.64	ERC	2.67	ERC	2.67	38
Safety Management System	X68	EC	7.00	EC	7.00	EC	7.00	EC	7.00	38
Sign Structure Inspection Program	X239	EC	1.20	EC	1.20	EC	1.20	EC	1.20	39
Sign Structure Rehabilitation Program	X239A	EC	1.00	EC	1.00	EC	1.00	EC	1.00	39
Signs Program, Statewide	X39	EC	5.00	EC	5.00	EC	5.00	EC	5.00	40
Smart Growth Initiatives	X186A	EC	1.00	EC	1.00	EC	1.00	EC	1.00	40
Speed Limit/No Passing Zone Review	06328	EC	1.00	EC	1.00	EC	1.00	EC	1.00	41
State Police Enforcement and Safety Services	X150	EC	8.20	EC	8.20	EC	8.20	EC	8.20	41
State Police Safety Patrols	04312	EC	2.00			EC	2.00			42
Statewide Incident Management Program	X230	EC	2.00	EC	2.00	EC	2.00	EC	2.00	42
Statewide Traffic Operations Center (STOC)	06324	EC	2.00	EC	2.00	EC	2.00	EC	2.00	43
Survey Program, National Highway System	99367	EC	0.10	EC	0.10	EC	0.10	EC	0.10	43
Traffic Monitoring Systems	X66	PLS	8.50	PLS	8.50	PLS	8.50	PLS	8.50	44
Traffic Signal Replacement	X47	EC	10.50	EC	10.50	EC	10.50	EC	10.50	44
Traffic Signal Timing and Optimization	04320	EC	1.70	EC	1.70	EC	1.70	EC	1.70	45
Training and Employee Development	X244	EC	1.80	EC	1.80	EC	1.80	EC	1.80	45
Transit Village Program	01316	EC	2.00	EC	2.00	EC	2.00	EC	2.00	46
Transportation and Community System Preservation Program	02393	ERC	4.85							46
Transportation Demand Management Program Support	X43	PLS	0.23	PLS	0.23	PLS	0.23	PLS	0.23	47
Transportation Enhancements	X107	ERC	10.00	ERC	10.00	ERC	10.00	ERC	10.00	47
Transportation Facility Security	05350	ERC	1.00	ERC	1.00	ERC	1.00	ERC	1.00	48
Transportation Security Initiatives	05337	ERC	1.00	ERC	1.00	ERC	1.00	ERC	1.00	48
Unanticipated Design, Right of Way and Construction Expenses, State	X11	ERC	31.90	ERC	13.55	ERC	32.14	ERC	25.21	49
Underground Exploration for Utility Facilities	X101	EC	0.10	EC	0.10	EC	0.10	EC	0.10	49
University Transportation Research Technology	X126	EC	2.00	EC	2.00	EC	2.00	EC	2.00	50
Utility Reconnaissance and Relocation	X182	EC	4.00	EC	4.00	EC	4.00	EC	4.00	50
Youth Employment and TRAC Programs	X199	EC	0.25	EC	0.25	EC	0.25	EC	0.25	51

NJTPA Transportation Improvement Program Fiscal Years 2007 - 2010
Transit Projects and Programs Summary

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Project	DBNUM	FY 2007 PHASE	COST	FY 2008 PHASE	COST	FY 2009 PHASE	COST	FY 2010 PHASE	COST	Page
Access to Region's Core (ARC)	T97	ERC	105.55	ERC	65.84	ERC	87.43	ERC	91.06	1
ADA--Platforms/Stations	T143	ERC	11.27	ERC	5.85	ERC	2.93	ERC	7.08	2
ADA--Vans	T70			CAP	1.44	CAP	1.44	CAP	1.44	3
AMTRAK Agreements	T44	ERC	40.00	ERC	40.00	ERC	40.00	ERC	40.00	4
Bridge and Tunnel Rehabilitation	T05	ERC	18.53	ERC	20.43	ERC	21.70	ERC	21.70	5
Building Capital Leases	T32	CAP	4.10	CAP	4.10	CAP	4.10	CAP	4.10	6
Bus Acquisition Program	T111	CAP	53.05	CAP	81.64	CAP	92.08	CAP	79.66	7
Bus Passenger Facilities/Park and Ride	T06	ERC	3.14	ERC	3.14	ERC	1.88	ERC	0.58	8
Bus Support Facilities and Equipment	T08	ERC	9.48	ERC	10.04	ERC	6.58	ERC	5.97	9
Bus Vehicle and Facility Maintenance/Capital Maintenance	T09	EC	24.19	EC	24.19	EC	24.19	EC	24.19	10
Capital Program Implementation	T68	ERC	13.54	ERC	14.15	ERC	14.79	ERC	15.46	11
Casino Revenue Fund	T515	ERC	24.87	ERC	24.87	ERC	24.87	ERC	24.87	12
Claims support	T13	EC	1.00	EC	1.00	EC	1.00	EC	1.00	13
Environmental Compliance	T16	ERC	1.80	ERC	2.52	ERC	2.52	ERC	2.52	14
Hoboken Terminal /Yard Rehabilitation	T82	ERC	0.76	ERC	0.83	ERC	0.86	ERC	4.91	15
Hudson/Bergen LRT System MOS I	T87	ERC	12.70	ERC	11.72	ERC	12.49	ERC	12.68	16
Hudson/Bergen LRT System MOS II	T89	ERC	125.27	ERC	78.41	ERC	25.58	ERC	27.92	17
Immediate Action Program	T20	ERC	11.89	ERC	11.17	ERC	11.84	ERC	16.25	18
Job Access and Reverse Commute Program	T199	SWI	5.00	SWI	5.00	SWI	5.00	SWI	5.00	19
Locomotive Overhaul	T53E	CAP	5.98	CAP	6.14	CAP	5.89	CAP	7.89	20
Major Bridge Program	T501	ERC	35.25	ERC	25.75	ERC	7.00	ERC	18.50	21
Miscellaneous	T122	ERC	0.36	ERC	0.36	ERC	0.36	ERC	0.36	22
Newark Broad Street Station Improvements and Service Expansion	T507			CON	1.97					23
Newark City Subway	T95	ERC	12.11	ERC	7.45	ERC	19.43	ERC	7.45	24
Newark City Subway Downtown Extension	T28	ERC	2.33	ERC	2.31	ERC	2.67	ERC	1.40	25
Newark Penn Station	T81	ERC	0.20	ERC	0.22	ERC	7.13			26
Other Rail Station/Terminal Improvements	T55	ERC	23.36	ERC	36.34	ERC	5.89	ERC	3.58	27
Physical Plant	T121	ERC	1.02	ERC	1.02	ERC	1.02	ERC	0.30	28
Preventive Maintenance-Bus	T135	CAP	65.17	CAP	69.96	CAP	70.53	CAP	70.53	29
Preventive Maintenance-Rail	T39	CAP	127.40	CAP	137.25	CAP	135.65	CAP	135.81	30
Private Carrier Equipment Program	T106	CAP	40.40	CAP	40.40	CAP	40.40	CAP	24.54	31
Rail Capital Maintenance	T34	CAP	57.25	CAP	57.25	CAP	57.25	CAP	57.25	32
Rail Fleet Overhaul	T53G	CAP	3.58	CAP	0.90			CAP	5.80	33
Rail Park and Ride	T117	ERC	2.50	ERC	2.92					34
Rail Rolling Stock Procurement	T112	CAP	34.08	CAP	32.79	CAP	48.73	CAP	73.64	35
Rail Support Facilities, Equipment and Capacity Improvements	T37	ERC	7.01	ERC	19.20	ERC	32.99	ERC	25.42	36
Section 5310 Program	T150	CAP	3.14	CAP	3.42	CAP	3.72	CAP	4.19	37
Section 5311 Program	T151	CAP	5.69	CAP	6.25	CAP	6.88	CAP	8.64	38

($ Millions)

Project *(Transit continued)*	DBNUM	FY 2007 PHASE	FY 2007 COST	FY 2008 PHASE	FY 2008 COST	FY 2009 PHASE	FY 2009 COST	FY 2010 PHASE	FY 2010 COST	Page
Security Improvements	T508	SWI	1.15	SWI	1.15	SWI	1.15	SWI	1.15	39
Signals and Communications/Electric Traction Systems	T50	ERC	6.87	ERC	8.05	ERC	11.25	ERC	11.25	40
Small/Special Services Program	T120	EC	1.79	EC	1.82	EC	1.84	EC	0.76	41
Study and Development	T88	PLS	3.75	PLS	3.31	PLS	3.39	PLS	3.49	42
Technology Improvements	T500	EC	18.00	EC	12.13	EC	11.48	EC	12.87	43
Track Program	T42	ERC	22.03	ERC	24.75	ERC	25.50	ERC	25.42	44
Transit Enhancements	T210	ERC	0.94	ERC	0.98	ERC	1.36	ERC	0.35	45
Transit Rail Initiatives	T300	ERC	111.92	ERC	116.97	ERC	112.00	ERC	118.00	46