2.0 PURPOSE AND NEED FOR THE PROPOSED PROJECT

2.1 Introduction

This section identifies the *purpose* of the Proposed Project (Section 2.2). It also establishes the *need* for the Proposed Project by outlining the existing and projected future transportation problems within the Turnpike corridor that the Proposed Project is intended to address. These transportation problems, and the underlying growth factors that contribute to them, are described in Section 2.3. Finally, Section 2.4 discusses the need for Turnpike mainline and interchange improvements to address the transportation problems identified.

2.2 Purpose of the Proposed Project

The *purpose* of the Proposed Project is to service existing and projected future traffic demand on the New Jersey Turnpike mainline and interchanges between Interchanges 6 and 9, and thereby to support the economic role of the Turnpike in moving goods and people within and through New Jersey in the most efficient manner possible. The purpose of the Proposed Project is also to address the operational, maintenance and safety needs of the Authority in its management of the Turnpike.

2.3 Transportation Problem Identification

2.3.1 Project Context and Impetus

The New Jersey Turnpike is the primary north-south, high-speed, limited access roadway in the state. In this capacity, the Turnpike provides a number of functions beneficial to New Jersey and the region, due in part to its location, as well as its ability to accommodate large volumes of free-flowing traffic. These functions are vital to the transportation needs of many of New Jersey's residents and travelers throughout the northeast, whether that travel is for personal, work, or commercial purposes. These functions are also vital to the movement of commerce within, to and from, and through the state.

The Turnpike functions as both an *interstate* and *intrastate* transportation link. In its interstate function, Turnpike interchanges connect the major east-west highways of New Jersey, particularly those highways of the interstate highway system which lead to centers within New Jersey and those of neighboring states; e.g., Wilmington (Delaware) and points south via I-295; Philadelphia (Pennsylvania) via I-76; southern Pennsylvania via I-276 (the Pennsylvania Turnpike); central and northern Pennsylvania via I-78 and I-80; and New York via I-287, I-278, I-78, I-495 and I-95. North of Interchange 6, the Turnpike is designated as I-95, the main north-south transportation corridor on the east coast in the interstate system. These interstate connections are important to the economy of the state and the region, as they contribute to the attractiveness of these areas for economic investment, as well as to their accessibility to and from outside markets. Two of these interstate connections are within the Project Corridor, specifically at Interchange 6 (connection to I-276, the Pennsylvania Turnpike, via the New Jersey Turnpike's Pearl Harbor Memorial Turnpike Extension) and at Interchange 7A (connection to I-195).

As New Jersey has developed, the Turnpike has also evolved into the spine of the comprehensive intrastate transportation system, with the majority of Turnpike patrons now using the facility for intrastate travel. This function of serving as the spine is particularly true for the central part of the state. From the roadways which feed the Turnpike in central New Jersey (specifically U.S. Route 206 at Interchange 7; I-195 at Interchange 7A; N.J. Route 33 at Interchange 8; N.J. Route 32 at Interchange 8A, and N.J. Route 18 at Interchange 9), the Turnpike collects significant amounts of traffic traveling from the dispersed suburban locations (both residential and commercial) to major employment centers in the region, including New York City, Newark, Trenton, Princeton, New Brunswick, and Philadelphia.

Due to its importance as an interstate and intrastate transportation link, and in response to population and employment growth, the Turnpike has experienced significant growth in traffic volumes over time. This growth is particularly pronounced in the central part of the state. Table 2.1 shows the growth in traffic volumes between Interchanges 6 and 9 since the last improvements to mainline capacity were undertaken as part of the 1985-1990 Widening Program (i.e., addition of one lane in each direction on the outer roadways from Interchange 11 to Interchange 14, and the southerly extension of the dual-dual roadway concept from Interchange 9 to Interchange 8A via the construction of two two-lane outer roadways). The percent change in traffic growth along these segments is compared with the percent change in traffic volumes for the Turnpike overall (both including the project segments and not including the project segments). As shown, the traffic volumes in the Project Corridor grew by over 49 percent from 1990 to 2002, while the Turnpike as a whole (including the Project Corridor) grew by about 31 percent. The average annual percent growth of the Project Corridor during this period was 4.2 percent, compared to 2.6 percent average annual growth of the Turnpike overall.

The primary factors which have contributed to traffic growth on the central New Jersey portion of the Turnpike over this period include: 1) increases in the state's population and employment; 2) a redistribution of the state's population and employment from its cities and older suburbs to newly suburbanized areas; and 3) changing household demographic patterns. These factors have contributed to an increased number of vehicles in the state, an increased number of trips made per vehicle, and an increased amount of mileage per trip. The major redistribution of northeastern and central New Jersey's population and employment which has occurred simultaneously with the absolute increases in those demographics has produced an increase in the number of trip origins and destinations, that is, more dispersed travel, and resultant increases in the number and length of automobile trips. The increasingly dispersed and suburbanized employment locations lead to increases in the number and length of automobile trips since these locations are generally accessible only by car.

In response to this traffic growth in central New Jersey, and the resulting increase in congestion that it has created, the Authority is proposing to widen and improve the existing six-lane Turnpike corridor between Interchanges 6 and 8A. The Authority is also proposing to construct the third lane in the outer roadway of the existing dual-dual roadway between Interchanges 8A and 9.

2.3.2 Existing Travel Conditions

As a result of both historical and recent trends, traffic levels on the portion of the Turnpike between Interchange 6 and Interchange 9 are either approaching or exceeding roadway capacity. Table 2.2 shows the 2005 traffic volumes, the density (i.e., passenger cars per mile per lane), and Level of Service (LOS) for the weekday AM and Friday PM peak hours on the Turnpike mainline segments associated with the Proposed Project.

The density represents the number of vehicles occupying a given length of a lane or roadway at a particular instant and is measured in passenger cars per mile per lane (pcpmpl). The number of vehicles is adjusted to account for size differences among cars, trucks, and buses. Trucks and buses are estimated to be the equivalent of 1.5 cars. The adjusted values are termed passenger car equivalents (PCE). On the New Jersey Turnpike, capacity is considered to be 1,850 PCEs per hour per lane.

Table 2.1
Historical Annual Two-Way Traffic Volumes By Turnpike Segment
1990-2002 (in millions)

Between Interchanges	Year													% Change 1990-2002	Average Annual % Growth
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002		
6 to JCT(1)	10.1	9.5	9.5	9.8	9.9	10.2	10.5	11.0	11.3	11.3	11.9	12.3	13.0	28.7%	2.4%
JCT(1) to 7	30.2	28.9	29.3	29.7	30.3	30.8	31.1	31.9	33.0	34.0	35.7	40.2	43.2	43.0%	3.6%
7 to 7A	33.3	32.7	33.3	33.7	34.0	34.8	35.0	35.9	37.1	38.2	39.8	44.3	47.4	42.3%	3.5%
7A to 8	34.0	33.5	34.3	35.1	35.9	37.5	38.1	39.4	40.7	42.0	43.6	48.4	52.2	53.5%	4.5%
8 to 8A	34.7	34.3	35.3	35.9	36.9	38.6	39.4	40.7	42.3	43.6	45.3	50.3	54.0	55.6%	4.6%
8A to 9	38.4	38.6	39.9	40.9	42.3	44.4	45.4	47.1	49.0	50.6	52.5	57.8	62.6	63.0%	5.3%
Average Project Corridor segments (Interchange 6 to 9)														49.9%	4.2%
Average New Jersey Turnpike (Not Including Project Corridor segments)														27.3%	2.3%
Average New Jersey Turnpike (Including Project Corridor segments)														31.1%	2.6%

Notes:
(1) Junction of Pearl Harbor Memorial Turnpike Extension with north-south NJ Turnpike mainline.
Source: Wilbur Smith Associates (2004).

Table 2.2
Year 2005 Level of Service
Mainline and Weaving Segments

Segment	AM Weekday			PM Weekday			PM Friday			PM Sunday		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Density	V/C	LOS	Density	V/C	LOS	Density	V/C	LOS	Density	V/C	LOS
Turnpike Mainline Northbound												
6 to 7	18.7	0.54	C	20.5	0.46	B	21.8	0.63	C	23.2	0.67	C
7 to 7A	21.6	0.63	C	20.0	0.50	B	22.5	0.65	C	24.7	0.71	C
7A to 8	27.4	0.77	**D**	17.1	0.58	C	25.0	0.72	C	27.4	0.74	C
8 to 8A	34.8	0.89	**D**	15.7	0.60	C	26.0	0.74	C	28.6	0.79	**D**
8A to 9	32.2/17.3	0.76/ 0.75	**D/D**	N/A	0.55/ 0.55	N/A	18.5/ 28.0	0.67/ 0.66	C/C	18.0/ 18.0	0.53/ 0.53	**C/C**
Turnpike Mainline Southbound												
6 to 7	20.3	0.47	B	29.6	0.58	C	33.4	0.87	**D**	24.3	0.70	C
7 to 7A	19.7	0.51	B	27.0	0.66	C	39.9	0.95	**E**	26.0	0.74	C
7A to 8	17.6	0.58	C	22.8	0.76	**D**	*	1.02	**F**	26.6	0.75	**D**
8 to 8A	16.3	0.59	C	19.9	1.01	**F**	*	1.01	**F**	26.9	0.76	**D**
8A to 9	18.1/19.3	0.56/ 0.56	C/C	N/A	0.56/ 0.56	N/A	35.1/ 19.5	0.78/ 0.78	**D/D**	17.3/ 17.3	0.50/ 0.50	B/B
Weaving Segment Southbound[4]												
8A to 8	8.1	0.71	C	16.9	0.96	**E**	24.8	1.19	**F**	14.2	0.88	**D**

Source: The Louis Berger Group, Inc. (2006).

Notes:
(1) Density is measured in passenger cars per mile per lane (pcpmpl).
(2) V/C = Volume Capacity Ratio.
(3) LOS = Level of Service.
(4) *Weaving Segments are portions of highway, usually between merge and diverge points, over which traffic streams cross paths through lane-changing maneuvers without the aid of traffic signals.*
XX/XX = Inner Roadway/Outer Roadway
** Exceeds Highway Capacity Manual analysis values (Density > 45 pcpmpl; Speed < 53 mph).*

Level of Service is a qualitative measure that describes operational conditions on a highway and provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Six levels of service (from A to F) are used, where A describes completely free-flow conditions and F represents the breakdown of traffic flow.

Based on its enabling legislation, the Authority is directed to construct and maintain a modern express highway, providing vehicular traffic with a non-congested roadway which does not expose motorists to hazardous conditions.[1] The Authority defines this obligation as providing a roadway capable of handling traffic at LOS D or better for the Proposed Project. LOS D is defined by the Highway Capacity Manual as being that level in which operations are approaching unstable flow and where freedom to maneuver within the traffic stream is severely limited. Therefore, LOS E and F are both

[1] New Jersey Statutes Annotated 27:23-1 et seq.

considered to be unacceptable in terms of operational conditions. Table 2.3 discusses the characteristics of LOS D as well as all other levels of service, as defined by the Highway Capacity Manual.

Table 2.3
Level of Service Descriptions

Level of Service	Flow	Descriptions
A	Free flow	LOS A describes completely free-flow conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway and by driver preferences. Maneuverability within the traffic stream is good. Minor disruptions to flow are easily absorbed without a change in travel speed.
B	Stable flow (upper speed range)	LOS B also indicates free flow, although the presence of other vehicles becomes noticeable. Average travel speeds are the same as in LOS A, but drivers have slightly less freedom to maneuver. Minor disruptions are still easily absorbed, although local deterioration in LOS will be more obvious.
C	Stable flow	In LOS C, the influence of traffic density on operations becomes marked. The ability to maneuver within the traffic stream is clearly affected by other vehicles. On multilane highways with a free-flow speed (FFS) above 50 mph, the travel speeds reduce somewhat. Minor disruptions can cause serious local deterioration in service, and queues will corm behind any significant traffic disruption.
D	Approaching unstable flow	At LOS D, the ability to maneuver is severely restricted due to traffic congestion. Travel speed is reduced by the increasing volume. Only minor disruptions can be absorbed without extensive queues forming and the service deteriorating.
E	Unstable flow	LOS E represents operations at or near capacity, an unstable level. Vehicles are operating with the minimum spacing for maintaining uniform flow. Disruptions cannot be dissipated readily, often causing queues to form and service to deteriorate to LOS F. For the majority of multilane highways with FFS between 45 and 60 mph, passenger-car mean speeds at capacity range from 42 to 55 mph but are highly variable and unpredictable.
F	Forced flow	LOS F represents forced or breakdown flow. It occurs either when vehicles arrive at a rate greater than the rate at which they are discharged, or when the forecast demand exceeds the computed capacity of a planned facility. Although operations at these points – and on sections immediately downstream – appear to be at capacity, queues form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing brief periods of movement followed by stoppages. Travel speeds within queues are generally less than 30 mph.

Source: Highway Capacity Manual (2000).

As shown in Table 2.2, under existing conditions the period and location of greatest congestion is on the southbound Turnpike segments between Interchanges 6 and 8A in the Friday PM peak hour; the mainline segments between Interchanges 7 and 8A, as well as the weaving segment south of 8A (the merge section where the five-lane dual-dual southbound roadway merges into the three-lane southbound roadway), all currently operate at LOS E or F.

Under these conditions, traffic operations during the peak period become extremely unstable because there is little, if any, available slack capacity on the roadway. Even minor disturbances or lane changes can be expected to produce extensive queuing. As traffic volumes continue to increase, forced-flow conditions will result where operating speeds can drop to zero because of downstream congestion.

In the northbound direction, several segments operate at LOS D and E in both the weekday AM and Friday PM peak hours; under current conditions, LOS D indicates that the roadway is approaching capacity. The segments between Interchanges 7A and 8 and between 8 and 8A currently operate at LOS D and E, respectively, during the AM weekday peak hour. The segments between Interchanges 6 and 7, 7 and 7A, 7A and 8, and 8 and 8A operate at LOS F during the Sunday PM peak hour. The segments between 7 and 7A, 7A and 8, and 8 and 8A currently operate at LOS E, LOS D, and LOS D, respectively, during the Friday PM peak hour.

In summary, the analysis of existing conditions indicates oversaturated conditions along the Turnpike from Interchanges 6 to 8A in the southbound direction during the Friday PM peak hour and in the northbound direction for several Turnpike segments in the weekday AM and Friday PM peak hours. The primary reason for the LOS E and F conditions in the southbound direction in the Friday PM peak is that the Turnpike mainline south of Interchange 8A, where there is a reduction from five to three lanes, is over capacity, i.e., the number of vehicles traveling on the Turnpike exceeds the lane capacity (the number of lanes needed to accommodate traffic flow). The problem is worse during evening peak hours as the lane reduction creates stop-and-go situations and traffic backups occur for miles.

2.3.3 Future Travel Demand

The primary basis for projecting future travel demand on the Turnpike is the projected growth in population, households and employment. Two additional factors will also contribute to future travel demand, particularly along the Proposed Project Corridor: 1) the redistribution of traffic between Pennsylvania and the New Jersey Turnpike at Interchange 6 as a result of a new interchange connecting the Pennsylvania Turnpike with Interstate Route I-95 in southeastern Pennsylvania; and 2) projected growth in freight movement between New Jersey ports/airports and central New Jersey/eastern Pennsylvania warehouses and distribution centers. These growth factors are discussed in this section, including a discussion of the relationship of population and employment growth to traffic volume increases on the Turnpike. The section concludes with an analysis of how this growth will affect Turnpike operations in the future if the Proposed Project is not constructed.

2.3.3.1 Population and Employment Growth Trends

Historical Overview

Since the opening of the Turnpike in the early 1950s, New Jersey has experienced significant increases in population and employment. Tables 2.4 and 2.5 show the growth trends in population and employment, respectively, by decade from 1970 to 2005 for population and from 1970 to 2004 for employment. As shown, the state as a whole exhibited an overall population increase of about 20 percent and an overall employment increase of about 47 percent during this period. Within central New Jersey (Burlington, Mercer, Middlesex, and Monmouth counties), this trend is even more dramatic. This four-county area had a nearly 32 percent increase in population and a nearly 83 percent increase in employment during the same period. Middlesex and Monmouth counties saw even greater employment increases, at 92 and 100 percent, respectively.

One of the reasons for the strong growth in central New Jersey is that a major redistribution of both population and employment has occurred simultaneously with the increases in these demographics. Following a pattern that has occurred throughout the United States, first population and then jobs have relocated away from central cities and older suburbs toward newer, less densely developed suburban areas.

Table 2.4
Historical Population Trends (1970-2005)

AREA	POPULATION								PERCENT CHANGE							1970-2005	
	1970	1975	1980	1985	1990	1995	2000	2005	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2005	Population Growth	% Change
Burlington	325,960	344,486	363,614	376,097	396,180	411,890	424,680	450,743	5.7%	5.6%	3.4%	5.3%	4.0%	3.1%	4.8%	124,783	38.2%
Mercer	305,091	315,506	307,796	314,133	326,477	337,476	351,578	366,256	3.4%	-2.4%	2.1%	3.9%	3.4%	4.2%	2.7%	61,165	20%
Middlesex	585,432	588,224	597,117	633,428	673,469	709,223	753,064	789,516	0.5%	1.5%	6.1%	6.3%	5.3%	6.2%	3.3%	204,084	34.8%
Monmouth	463,929	491,362	504,007	528,986	554,210	583,899	617,277	635,952	5.9%	2.6%	5.0%	4.8%	5.4%	5.7%	2.6%	172,023	37.1%
TOTAL	1,680,412	1,739,578	1,772,534	1,852,644	1,950,336	2,042,488	2,146,599	2,242,467	3.5%	1.9%	4.5%	5.3%	4.7%	5.1%	3.3%	562,055	33.4%
New Jersey	7,190,282	7,341,417	7,376,330	7,565,530	7,762,963	8,083,242	8,433,613	8,717,925	2.1%	0.5%	2.6%	2.6%	4.1%	4.3%	2.5%	1,527,643	21.2%

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce; 2005 U.S. Census Estimates.

Table 2.5
Historical Employment Trends (1970-2004)

AREA	EMPLOYMENT								PERCENT CHANGE							1970-2004	
	1970	1975	1980	1985	1990	1995	2000	2004	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2003	Employment Growth	% Change
Burlington	125,322	114,151	127,616	153,116	174,431	175,803	202,208	217,309	-8.9%	11.8%	20.0%	13.9%	0.8%	15.0%	7.5%	91,987	73.4%
Mercer	141,125	149,225	167,895	180,422	195,889	197,860	215,504	226,443	5.7%	12.5%	7.5%	8.6%	1.0%	8.9%	5.1%	85,318	60.5%
Middlesex	219,483	246,165	294,869	330,581	370,541	382,455	432,859	421,088	12.2%	19.8%	12.1%	12.1%	3.2%	13.2%	-2.7%	201,605	91.9%
Monmouth	137,836	150,906	179,315	208,650	229,891	233,951	263,149	275,710	9.5%	18.8%	16.4%	10.2%	1.8%	12.5%	4.8%	137,874	100.0%
TOTAL	623,766	660,447	769,695	872,769	970,752	990,069	1,113,720	1,140,550	5.9%	16.5%	13.4%	11.2%	2.0%	12.5%	2.4%	516,784	82.8%
New Jersey	2,800,562	2,841,180	3,214,235	3,547,228	3,755,915	3,722,613	4,100,287	4,106,238	1.5%	13.1%	10.4%	5.9%	-0.9%	10.1%	0.1%	1,305,676	46.6%

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce.

Projected Population and Employment Growth

Considerable growth in population and employment is expected over the next 30 years in central New Jersey and southeastern Pennsylvania. Tables 2.6, 2.7 and 2.8 show county-level population, household, and employment projections, respectively; the projections are derived from recent forecasts developed by the two Metropolitan Planning Organizations (MPOs) that serve the Project Corridor (i.e., the North Jersey Transportation Planning Authority [NJTPA] and the Delaware Valley Regional Planning Commission [DVRPC]). As shown in the tables, the four counties within or adjacent to the Project Corridor (i.e., Burlington, Mercer, Middlesex, and Monmouth) are projected to grow more quickly in all three demographic dimensions than the two transportation planning regions as a whole. The projected rate of population and household growth in these counties is particularly strong, each being almost 50 percent higher than the equivalent growth rate for the combined two transportation planning regions as a whole.

2.3.3.2 Relationship of Population and Employment Growth to Traffic Volume Increases on the Turnpike

The strong association between growth in a region and increased traffic is well documented in the transportation literature and can be easily observed in the trends of traffic volumes and population and employment growth in New Jersey, as indicated in the previous sections. An analysis of this historic relationship using statistical tests was performed for the Proposed Project for the years 1970-2002 and found very strong relationships between the independent variables of population and employment and the dependent variable of vehicle miles traveled. The analysis indicates that population and employment at both the county and state levels are strongly correlated with the volume of travel on the New Jersey Turnpike. The analysis confirms the observation that the stronger the population and employment growth in New Jersey, the greater the growth in traffic volumes on the Turnpike.

2.3.3.3 Traffic Redistribution from the Proposed New Pennsylvania Turnpike/I-95 Interchange

Interstate Route I-95 is the primary north-south transportation corridor serving the east coast of the United States, extending 1,900 miles from Miami, Florida to the Maine border with New Brunswick, Canada. When I-95 was extended north through eastern Pennsylvania in 1969, no provisions were made for a direct connection to the Pennsylvania Turnpike (I-276), a 513-mile east-west expressway serving southern Pennsylvania and connecting to the New Jersey Turnpike at Interchange 6 via the Pearl Harbor Memorial Turnpike Extension (PHMTE). Over the years, the absence of a direct link between I-95 and the Pennsylvania Turnpike has created confusion for motorists, as I-95 continues to be designated from the Pennsylvania Turnpike in southeastern Pennsylvania north to Trenton, New Jersey, where this designation ends at I-295 north of Trenton. The I-95 designation then continues on the New Jersey Turnpike from Interchange 6 northward. The absence of a direct connection has also increased congestion on local area roads, as motorists seek more efficient driving routes through the southeast Pennsylvania/central New Jersey region.

The Pennsylvania Turnpike/I-95 Interchange Project seeks to correct this deficiency by providing a direct connection between the Pennsylvania Turnpike and I-95 (at a point between Interchanges 28 and 29 of the Pennsylvania Turnpike), thus making I-95 continuous throughout the Mid-Atlantic region (Figure 2-1).[2] The project, which is currently in final design, consists of various elements, including a

[2] Federal Highway Administration/Pennsylvania Department of Transportation/Pennsylvania Turnpike Commission, *Pennsylvania Turnpike/Interstate 95 Interchange Project Final Environmental Impact Statement/Section 4(f) Evaluation*, June 2003.

Table 2.6
Existing and Future Population Projections

COUNTY/MPO	POPULATION			% GROWTH/(DECLINE)	
	2005	2012	2032	2005-2012	2005-2032
Bergen/NJTPA	889,000	900,388	932,925	1.3	4.9
Burlington/DVRPC	**441,407**	**466,622**	**538,667**	**5.7**	**22.0**
Camden/NJTPA	509,012	510,585	515,078	0.3	1.2
Essex/NJTPA	801,487	819,809	872,160	2.3	8.8
Gloucester/NJTPA	269,075	287,774	341,201	6.9	26.8
Hudson/NJTPA	617,902	638,731	698,243	3.4	13.0
Hunterdon/NJTPA	129,238	146,213	194,714	13.1	50.7
Mercer/NJTPA	**355,542**	**367,883**	**403,141**	**3.5**	**13.4**
Middlesex/NJTPA	**763,450**	**794,483**	**883,149**	**4.1**	**15.7**
Monmouth/NJTPA	**628,477**	**659,336**	**747,507**	**4.9**	**18.9**
Morris/NJTPA	478,558	498,102	553,942	4.1	15.8
Ocean/NJTPA	521,804	547,209	619,796	4.9	18.8
Passaic/NJTPA	487,467	483,816	473,384	(0.7)	(2.9)
Somerset/NJTPA	303,468	317,417	357,270	4.6	17.7
Sussex/NJTPA	150,791	166,267	210,484	10.3	39.6
Union/NJTPA	522,964	524,003	526,979	0.2	0.8
Warren/NJTPA	106,357	115,508	141,653	8.6	33.2
Berks*	13,116	13,927	16,243	6.2	23.8
Bucks/DVRPC	627,724	669,849	790,204	6.7	25.9
Chester/DVRPC	458,259	492,906	591,896	7.6	29.2
Delaware/DVRPC	549,683	546,455	537,231	(0.6)	(2.3)
Montgomery/DVRPC	768,920	796,838	876,606	3.6	14.0
Philadelphia/DVRPC	1,514,039	1,509,125	1,495,086	(0.3)	(1.3)
Four Project Area Counties	**2,288,324**	**2,188,876**	**2,572,464**	**4.6**	**17.5**
TOTAL TWO-MPO REGION	**11,907,738**	**12,273,246**	**13,317,559**	**3.1**	**11.8**

Source: Urbitran, based on projections prepared by Delaware Valley Regional Planning Commission (DVRPC) and North Jersey Transportation Planning Authority (NJTPA), 2006.

** Berks County is within the Reading Area Transportation Study area, not the DVRPC. However, the DVRPC transportation model covers the entire town of Boyertown, which lies partly in Montgomery County but mostly in Berks County. The Berks County numbers in the table reflect only this town, whereas the numbers for all the other counties represent the entire counties.*

Table 2.7
Existing and Future Household Projections

AREA	NUMBER OF HOUSEHOLDS			% GROWTH/(DECLINE)	
	2005	2012	2032	2005-2012	2005-2032
Bergen/NJTPA	334,559	343,314	368,329	2.6	10.1
Burlington/DVRPC	**159,719**	**167,248**	**188,759**	**4.7**	**18.2**
Camden/NJTPA	185,009	184,644	183,599	(0.2)	(0.8)
Essex/NJTPA	288,733	300,504	334,021	4.1	15.7
Gloucester/NJTPA	95,249	100,884	116,982	5.9	22.8
Hudson/NJTPA	235,847	248,210	283,533	5.2	20.2
Hunterdon/NJTPA	46,599	52,991	71,254	13.7	52.9
Mercer/NJTPA	**127,953**	**133,216**	**148,254**	**4.1**	**15.9**
Middlesex/NJTPA	**272,721**	**288,794**	**334,716**	**5.9**	**22.7**
Monmouth/NJTPA	**232,672**	**252,396**	**308,749**	**8.5**	**32.7**
Morris/NJTPA	173,891	183,661	211,575	5.6	21.7
Ocean/NJTPA	208,039	225,862	276,785	8.6	33.0
Passaic/NJTPA	165,473	169,263	180,092	2.3	8.8
Somerset/NJTPA	111,938	118,826	138,506	6.2	23.7
Sussex/NJTPA	53,268	58,944	75,162	10.7	41.1
Union/NJTPA	187,380	190,329	198,759	1.6	6.1
Warren/NJTPA	40,701	45,464	59,075	11.7	45.1
Berks*	5,169	5,400	6,060	4.5	17.2
Bucks/DVRPC	229,299	244,075	286,293	6.4	24.9
Chester/DVRPC	167,031	179,859	216,509	7.7	29.6
Delaware/DVRPC	205,853	205,211	203,376	(0.3)	(1.2)
Montgomery/DVRPC	294,300	305,754	338,481	3.9	15.0
Philadelphia/DVRPC	590,643	591,429	593,677	0.1	0.5
Four Project Area Counties	**793,065**	**841,653**	**980,477**	**6.1**	**23.6**
TOTAL TWO-MPO REGION	**4,412,088**	**4,596,280**	**5,122,545**	**4.2**	**16.1**

Source: Urbitran, based on projections prepared by Delaware Valley Regional Planning Commission (DVRPC) and North Jersey Transportation Planning Authority (NJTPA), 2006.
** Berks County is within the Reading Area Transportation Study area, not the DVRPC. However, the DVRPC transportation model covers the entire town of Boyertown, which lies partly in Montgomery County but mostly in Berks County. The Berks County numbers in the table reflect only this town, whereas the numbers for all the other counties represent the entire counties.*

Table 2.8
Existing and Future Employment Projections

AREA	EMPLOYMENT			% GROWTH/(DECLINE)	
	2005	2012	2032	2005-2012	2005-2032
Bergen/NJTPA	462,655	488,177	561,098	5.5	21.3
Burlington/DVRPC	**212,143**	**225,585**	**263,992**	**6.3**	**24.4**
Camden/NJTPA	226,378	239,601	277,383	5.8	22.5
Essex/NJTPA	367,499	381,572	421,783	3.8	14.8
Gloucester/NJTPA	104,103	110,594	129,141	6.2	24.1
Hudson/NJTPA	253,449	275,213	337,396	8.6	33.1
Hunterdon/NJTPA	60,347	71,132	101,946	17.9	68.9
Mercer/NJTPA	**227,292**	**242,204**	**284,812**	**6.6**	**25.3**
Middlesex/NJTPA	**438,388**	**473,384**	**573,372**	**8.0**	**30.8**
Monmouth/NJTPA	**240,561**	**259,030**	**311,801**	**7.7**	**29.6**
Morris/NJTPA	284,057	312,095	392,203	9.9	38.1
Ocean/NJTPA	144,929	161,904	210,405	11.7	45.2
Passaic/NJTPA	183,521	184,094	185,732	0.3	1.2
Somerset/NJTPA	190,109	220,701	308,107	16.1	62.1
Sussex/NJTPA	40,168	44,004	54,965	9.6	36.8
Union/NJTPA	261,141	273,962	310,594	4.9	18.9
Warren/NJTPA	39,576	43,044	52,955	8.8	33.8
Berks*	6,951	7,472	8,959	7.5	28.9
Bucks/DVRPC	281,371	301,317	358,306	7.1	27.3
Chester/DVRPC	255,611	279,370	347,254	9.3	35.9
Delaware/DVRPC	244,509	253,392	278,773	3.6	14.0
Montgomery/DVRPC	510,948	536,527	609,611	5.0	19.3
Philadelphia/DVRPC	761,167	788,846	867,928	3.6	14.0
Four Project Area Counties	**1,118,384**	**1,200,203**	**1,433,977**	**7.2**	**28.2**
TOTAL TWO-MPO REGION	**5,796,872**	**6,173,222**	**7,248,616**	**6.5**	**25.0**

Source: Urbitran, based on projections prepared by Delaware Valley Regional Planning Commission (DVRPC) and North Jersey Transportation Planning Authority (NJTPA), 2006.

** Berks County is within the Reading Area Transportation Study area, not the DVRPC. However, the DVRPC transportation model covers the entire town of Boyertown, which lies partly in Montgomery County but mostly in Berks County. The Berks County numbers in the table reflect only this town, whereas the numbers for all the other counties represent the entire counties.*

high-speed fully directional interchange between the two highways, a new toll plaza west of the interchange for motorists using the Pennsylvania Turnpike, and an additional bridge over the Delaware River. The existing Delaware River Bridge carries two-way traffic on four travel lanes (two in each direction). The existing bridge will be reconstructed to carry three lanes of westbound traffic and the new bridge will carry three lanes of eastbound traffic. From the widened bridge, these travel lanes will connect to Interchange 6 of the New Jersey Turnpike and the PHMTE. The section of the Pennsylvania Turnpike east of the new I-95 interchange and its connection with the New Jersey Turnpike will then be redesignated as I-95, thus completing the missing link of I-95. The current stretch of I-95 north of the new interchange will be redesignated as I-295. All of the components of the project except the new bridge are expected to be complete in 2014; the construction period for the bridge is expected to be 2014-2018.

According to the results of the traffic analysis prepared for the Pennsylvania Turnpike/I-95 project, the new high-capacity interchange is expected to cause a significant redistribution of traffic patterns in the region, with people using the Pennsylvania and New Jersey Turnpikes who would not travel on these routes otherwise.[3] In this same regard, more people would connect to the New Jersey Turnpike at Interchange 6 via the direct I-95 route from Pennsylvania than do at present. Table 2.9 shows the increased daily traffic projected for the New Jersey Turnpike as a result of the new interchange in Pennsylvania. The effects of this additional traffic would be felt on the New Jersey Turnpike from the southern end of the Turnpike at Interchange 1 near Deepwater to as far north as Interchange 10 in Edison/ Metuchen.

Table 2.9
Increased Daily Traffic on the New Jersey Turnpike Attributed to the New I-95/Pennsylvania Turnpike Interchange

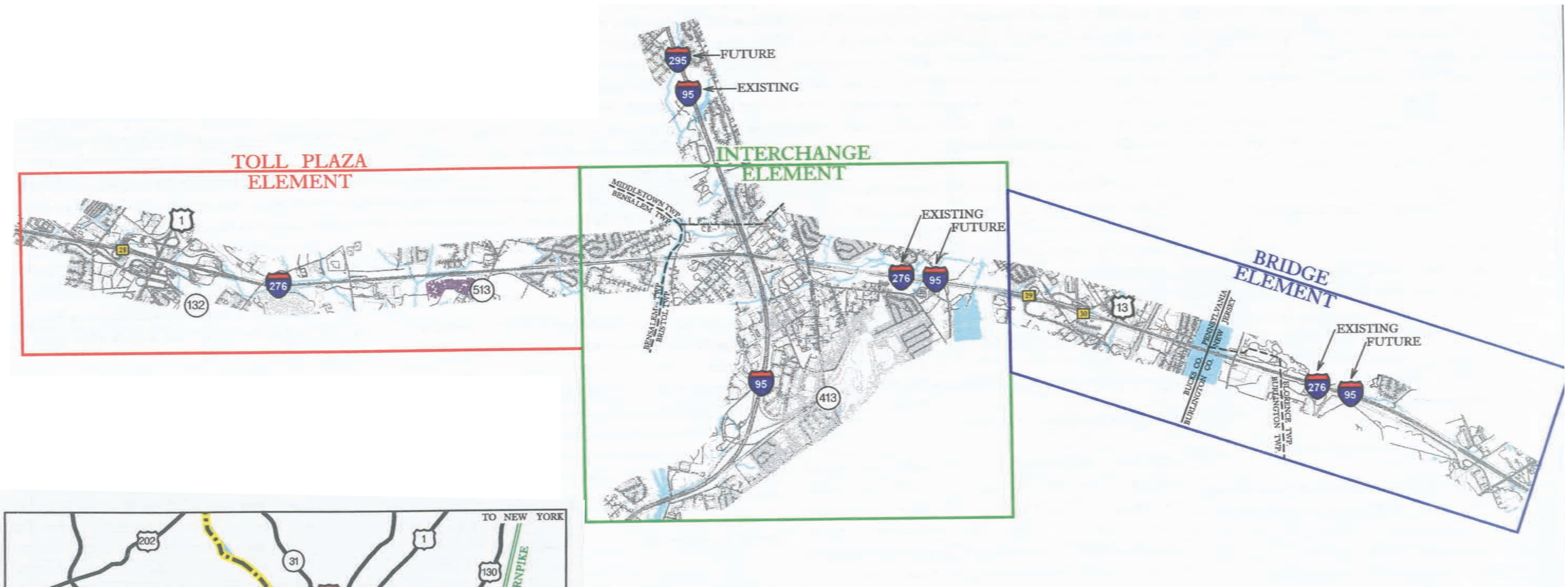
Location	Daily Vehicles	
	Existing (2005)	Projected (2025)
New Jersey-Pennsylvania State Line	12,600	18,900
Pennsylvania Turnpike Extension East of Route 130	7,600	11,400
New Jersey Turnpike North of Interchange 6	4,000	6,300
New Jersey Turnpike South of Interchange 6	3,600	5,100

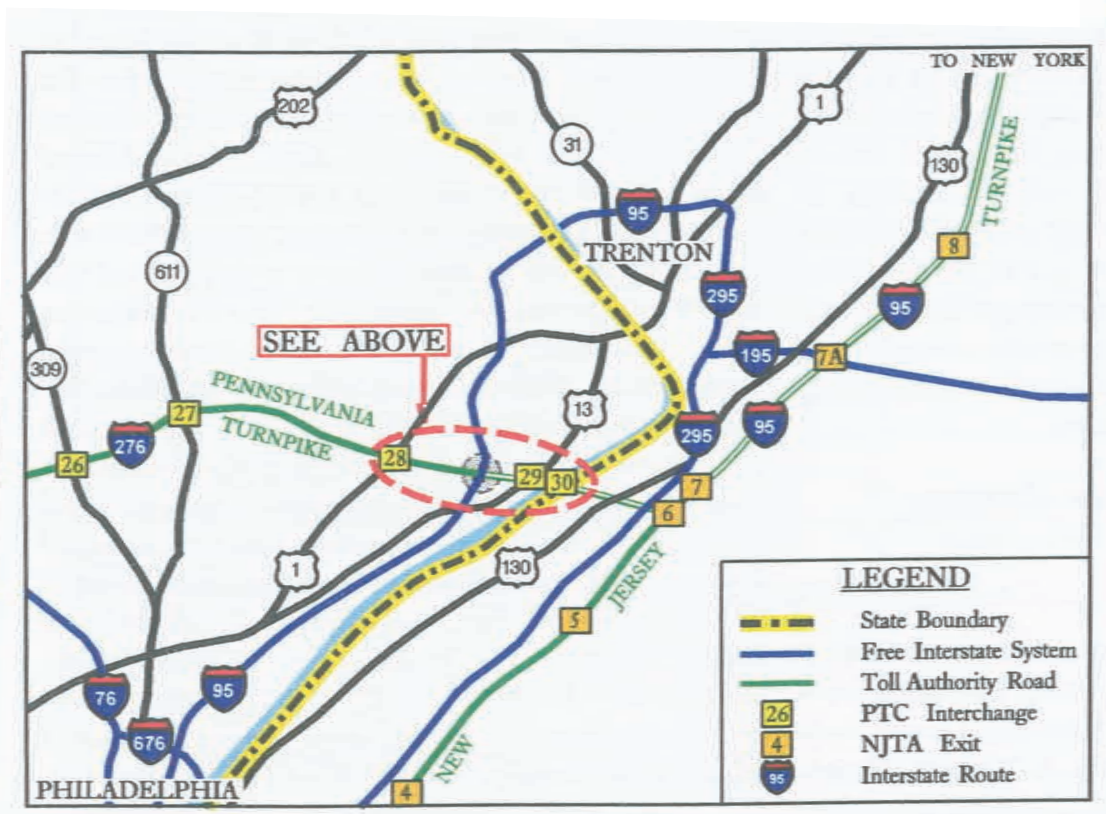
Source: Wilbur Smith Associates (2004).

2.3.3.4 New Jersey Freight Growth Trends

In addition to population/employment growth and redistributed traffic from the Pennsylvania Turnpike/I-95 interchange project described above, the success and growth of Port Elizabeth and Port Newark as major world-class shipping destinations and of Newark Liberty International Airport as an air freight destination will assure continued growth in truck transportation along the New Jersey Turnpike over the next 20 years.[4] Over 375.2 million tons of freight currently moves through New Jersey each year; of that amount, approximately 283.1 (or about 75 percent) travel by truck.

[3] Wilbur Smith, 2004.
[4] Ibid.





Source: PENNDOT, Pennsylvania Turnpike Commission

Proposed Pennsylvania Turnpike/Interstate 95 Interchange Project

New Jersey Turnpike Interchange 6 to 9 Widening
Burlington, Mercer and Middlesex Counties
Executive Order No. 215
Environmental Impact Statement

NEW JERSEY TURNPIKE AUTHORITY
NEW JERSEY TURNPIKE

FIGURE 2-1

Effective goods movement is essential to the New Jersey and regional economy. According to the NJTPA's *Freight System Performance Assessment Report*,[5] there are direct jobs associated with cargo handling by the region's marine terminals, airports, railroads, and truckers; there are indirect jobs associated with re-handling and value-added processing of that cargo through the region's warehouse/distribution and processing centers; and there are jobs created by the region's producers that are made possible because of the cost-effective access to regional, national, and international markets. The region's status as a freight hub is a key advantage in retaining and attracting businesses, and in supporting its overall economy.

The New Jersey Turnpike/I-95 corridor represents one of the most critical through truck routes in the state.[6] The corridor extends through the state from Deepwater in the south to Fort Lee in the north. Interstate connections are provided to New York and New England via the George Washington Bridge, and to Delaware and the southeastern region of the United State via the Delaware Memorial Bridge. The mainline of the New Jersey Turnpike serves as the backbone of the corridor. The portion of the Turnpike through Bergen, Hudson, Essex, Union and Middlesex counties carries more than 180 trucks per hour during the peak period.[7]

The primary sources of freight ultimately carried by truck in New Jersey are maritime port facilities, rail, and air cargo. The Port of New York and New Jersey (PONYNJ) maritime port facilities in Newark, Elizabeth and Bayonne comprise the leading container port on the U.S. east coast. In addition to these facilities, the U.S. Army Corps of Engineers (USACE) identifies more than 180 freight-handling marine terminals in the entire PONYNJ. Overall, the PONYNJ as a whole handled over 134 million tons of traffic in 2002. Container handling through the region's seaports is expected to grow rapidly, and will triple by the year 2030.[8]

In addition to the container flows that enter and exit the region via the major marine terminals, a significant volume of containers enter and exit the region through intermodal railyards. The intermodal railyards serve as the local distribution nodes for containers shipped to and from the west coast ports via the Landbridge.[9] The Landbridge is effectively a series of major rail corridors spanning the United States, accommodating demand for trans-continental shipping of containers and other commodity flows. Intermodal rail traffic in the region is expected to triple or quadruple by the year 2030, while non-container rail traffic will double in that period.

Air cargo is primarily focused on the movement of high-value, light-weight, time-sensitive commodities, and relies almost exclusively on trucking for its "last mile" connections. Newark Liberty International Airport (EWR) is the hub of air cargo activity in the region, and the overnight/small package center for the larger bi-state (New Jersey and New York) area. It is also one of the largest hubs of air cargo activity in the world.[10] EWR handled over 960,000 tons of freight in 2003. Air cargo is expected to double by 2030 and, because air carriers are increasingly using trucking for domestic moves, some of this growth will actually be on trucks.

Warehouses and distribution centers play a key role in goods distribution in New Jersey, and the state has one of the leading concentrations of these centers in North America. Warehouses and distribution centers add value to the freight moving through them and represent a substantial economic activity in

[5] Cambridge Systematics, *North Jersey Transportation Planning Authority (NJTPA) Freight System Performance Assessment,* Final Summary Report, April 2005.
[6] New Jersey Department of Transportation, *Transportation Choices 2025* (Urban Transportation Supplement, Strategic Direction and Summary Report), March 2001.
[7] Cambridge Systematics, 2005.
[8] Ibid.
[9] Edwards and Kelcey, *Portway Extensions Concept Development Study*, Volume I, September 2003.
[10] Cambridge Systematics, 2005.

New Jersey. It is estimated that nearly 422,000 people work in New Jersey warehouses and distribution centers, making this activity one of the leading job generators in the state. The northern/central New Jersey area contains over 778 million square feet of industrial property. The epicenter of this development is in Middlesex County, with over 183 million square feet of these properties in 2002. Middlesex County saw a 23 percent growth in industrial space between 1998 and 2002.[11] The prevailing trend for development of these facilities has been for newer, larger warehouses to be built in outlying "greenfield" areas, particularly near New Jersey Turnpike Interchanges 8A (Middlesex County) and 7A (Mercer County), as well as in eastern Pennsylvania (Harrisburg).

Trucks are the glue that holds the entire freight transportation system together, and the majority of truck trips associated with freight movement in New Jersey are carried on the New Jersey Turnpike. For instance, peak hour truck VMT (i.e., vehicle miles traveled) is projected to grow within the NJTPA planning area by 2½ times by 2030, and non-container trucking will roughly double during that time.[12] Even with this rapid growth, year 2030 truck VMT will represent less than five percent of total peak period VMT. However, the effects of truck traffic tend to be concentrated on selected network segments, rather than spread across the entire network, so trucks can have a significant effect on critical links, particularly those along major interstates like the New Jersey Turnpike.

2.3.3.5 Future Traffic Congestion on the Turnpike

Based on the population/employment projections and other growth factors described in the previous sections, future traffic volumes by mainline segment in the Project Corridor were developed for the estimated completion year of 2012 and the design year of 2032. The overall growth of traffic volumes in the Interchange 6 to 8A corridor northbound is expected to be nearly 67 percent between 2005 and 2032; the southbound growth is expected to be about 92 percent during this period. With this level of increased traffic demand, travel conditions on the existing mainline would become intolerable. Tables 2.10, 2.11, 2.12, and 2.13 show the expected traffic volumes, volume/capacity ratios and LOS by segment (both northbound and southbound) for the weekday AM peak hours, weekday (not including Friday) PM peak hours, Friday PM peak hours, and Sunday PM peak hours respectively, assuming no change in roadway capacity (the No Build condition). As indicated in the tables, all segments within the project area will experience conditions of extreme congestion by the design year of 2032.

The weekday AM peak hour will be among the most heavily traveled times for both northbound and southbound traffic, with all segments operating at LOS E or F. As indicated in Table 2.10, by 2032 traffic volumes will increase by approximately 52 to 76 percent in the northbound direction and by approximately 82 to 114 percent in the southbound direction, depending on the segment and the limiting effect of capacity constraints. The segment with the highest weekday AM peak hour growth will be southbound from Interchange 7 to Interchange 6, on which the peak hour traffic volumes will increase from 2,971 in 2005 to 6,364 in 2032, an overall growth of over 114 percent. This growth will cause this segment to deteriorate from an existing LOS B to LOS E in 2032. Several segments (i.e., Interchanges 7-7A, 7A-8 and 8-8A) will experience volume increases 82 percent or greater in the southbound direction, while two segments (i.e., Interchanges 6-7 and 7-7A) will increase by 75 percent or greater in the northbound direction. All segments within the Project Corridor will experience volume increases of at least 52 percent in either direction during the weekday AM peak hour.

The weekday PM peak hour will typically be less heavily traveled than the Friday PM peak hour in the southbound direction, but will still exhibit substantial increases in traffic volumes in both the northbound and southbound directions. As shown in Table 2.11, by 2032 traffic volumes of each segment within the Project Corridor will increase by approximately 71 to 89 percent in the northbound

[11] Ibid.
[12] Ibid.

Table 2.10
Level of Service Comparison
AM Weekday (Monday-Friday) Peak Hour

Segment	VOLUME					V/C, DENSITY & LOS								
	2005 Existing	2012 No Build		2032 No Build		2005 Existing			2012 No Build			2032 No Build		
	Volume	Volume	Change From 2005	Volume	Change From 2005	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
Turnpike Northbound														
6 to 7	3,429	4,320	26.0%	6,050	76.4%	18.7	0.54	C	0.68	23.6	C	0.94	38.4	E
7 to 7A	3,950	4,838	22.5%	6,910	74.9%	21.6	0.63	C	0.76	27.1	D	1.08	*	F
7A to 8	4,872	5,864	20.4%	7,955	63.3%	27.4	0.77	D	0.92	37.2	E	1.25	*	F
8 to 8A	5,729	6,685	16.7%	8,724	52.3%	34.8	0.89	D	1.04	*	F	1.37	*	F
Turnpike Southbound														
6 to 7	2,971	3,934	32.4%	6,364	114.2%	20.3	0.47	B	0.63	21.6	C	1.00	44.6	E
7 to 7A	3,204	3,795	18.5%	5,915	84.6%	19.7	0.51	B	0.61	20.9	C	0.93	37.7	E
7A to 8	3,587	4,227	17.8%	6,734	87.7%	17.6	0.58	C	0.68	23.4	C	1.06	*	F
8 to 8A	3,680	4,229	14.9%	6,691	81.8%	16.3	0.59	C	0.68	23.7	C	1.07	*	F

Notes:
(1) Density is measured in passenger cars per mile per lane (pcpmpl).
(2) V/C = Volume Capacity Ratio.
(3) LOS = Level of Service.
Source: The Louis Berger Group (2006).

Table 2.11
Level of Service Comparison
PM Weekday (Monday-Thursday) Peak Hour

Segment	VOLUME					DENSITY, V/C & LOS								
	2005 Existing	2012 No Build		2032 No Build		2005 Existing			2012 No Build			2032 No Build		
	Volume	Volume	Change From 2005	Volume	Change From 2005	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
Turnpike Northbound														
6 to 7	2,917	3,534	21.2%	5,511	88.9%	20.5	0.46	B	0.55	18.9	C	0.85	31.7	D
7 to 7A	3,167	3,785	19.5%	5,669	79.0%	20.0	0.50	B	0.59	20.3	C	0.87	33.4	D
7A to 8	3,652	4,446	21.7%	6,262	71.5%	17.1	0.58	C	0.70	24.2	C	0.97	42.0	E
8 to 8A	3,793	4,565	20.4%	6,584	73.6%	15.7	0.60	C	0.72	25.1	C	1.03	*	F
Turnpike Southbound														
6 to 7	3,679	4,029	9.5%	5,263	43.1%	29.6	0.58	C	0.64	21.9	C	0.82	30.0	D
7 to 7A	4,117	4,424	7.5%	5,652	37.3%	27.0	0.66	C	0.70	24.4	C	0.88	34.1	D
7A to 8	4,720	5,215	10.5%	6,427	35.3%	22.8	0.76	D	0.82	30.3	D	1.00	*	F
8 to 8A	5,000	5,689	10.5%	7,579	51.6%	19.9	1.01	F	0.89	34.8	D	1.18	*	F

Notes:
(1) Density is measured in passenger cars per mile per lane (pcpmpl).
(2) V/C = Volume Capacity Ratio.
(3) LOS = Level of Service.
Source: The Louis Berger Group (2006).

Table 2.12
Level of Service Comparison
PM Friday Peak Hour

Segment	VOLUME					DENSITY, V/C & LOS								
	2005 Existing	2012 No Build		2032 No Build		2005 Existing			2012 No Build			2032 No Build		
	Volume	Volume	Change From 2005	Volume	Change From 2005	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
Turnpike Northbound														
6 to 7	4,139	4,891	18.17%	6,286	51.9%	21.8	0.63	C	0.74	26.3	D	0.95	39.8	E
7 to 7A	4,268	5,097	19.42%	6,667	56.2%	22.5	0.65	C	0.78	27.7	D	1.01	*	F
7A to 8	4,640	5,489	19.42%	6,958	50.0%	25.0	0.72	C	0.84	31.4	D	1.06	*	F
8 to 8A	4,785	5,685	18.81%	7,599	58.8%	26.0	0.74	C	0.87	32.9	D	1.17	*	F
Turnpike Southbound														
6 to 7	5,664	5,664	0.00%	6,838	20.7%	33.4	0.87	D	0.93	37.4	E	1.05	*	F
7 to 7A	6148	6,148	0.00%	7,365	19.8%	39.9	0.95	E	1.00	44.8	E	1.13	*	F
7A to 8	6,607	6,605	-0.03%	7,551	14.3%	*	1.02	F	1.07	*	F	1.16	*	F
8 to 8A	6,524	6,580	0.86%	8,467	29.8%	*	1.01	F	1.23	*	F	1.30	*	F

Notes:
(1) Density is measured in passenger cars per mile per lane (pcpmpl).
(2) V/C = Volume Capacity Ratio.
(3) LOS = Level of Service.
Source: The Louis Berger Group (2006).

Table 2.13
Level of Service Comparison
PM Sunday Peak Hour

Segment	VOLUME					DENSITY, V/C & LOS								
	2005 Existing	2012 No Build		2032 No Build		2005 Existing			2012 No Build			2032 No Build		
	Volume	Volume	Change From 2005	Volume	Change From 2005	V/C	Density	LOS	V/C	Density	LOS	V/C	Density	LOS
Turnpike Northbound														
6 to 7	4,500	5,390	890	7,930	76.2%	23.2	0.67	C	0.80	29.1	D	1.18	*	F
7 to 7A	4,760	5,720	960	8,230	72.9%	24.7	0.71	C	0.85	32.0	D	1.23	*	F
7A to 8	5,150	6,270	1,120	8,630	67.6%	27.4	0.74	C	0.94	38.3	E	1.29	*	F
8 to 8A	5,320	6,440	1,120	8,560	60.9%	28.6	0.79	D	0.96	40.6	E	1.28	*	F
Turnpike Southbound														
6 to 7	4,690	6,270	1,580	8,940	90.6%	24.3	0.70	C	0.93	37.8	E	1.33	*	F
7 to 7A	4,950	6,430	1,480	9,090	83.6%	26.0	0.74	C	0.95	40.0	E	1.35	*	F
7A to 8	5,040	6,240	1,200	8,570	70.0%	26.6	0.75	D	0.93	37.4	E	1.27	*	F
8 to 8A	5,090	6,250	1,160	8,550	68.0%	26.9	0.76	D	0.93	37.6	E	1.27	*	F

Notes:
(1) Density is measured in passenger cars per mile per lane (pcpmpl).
(2) V/C = Volume Capacity Ratio.
(3) LOS = Level of Service.
Source: The Louis Berger Group (2006).

direction, and by approximately 35 to 52 percent in the southbound direction. This growth will cause half of the segments to operate at LOS E or F in the weekday PM peak hour. All segments within the Project Corridor will experience northbound volume increases of at least 71 percent during the weekday PM peak hour.

The Friday PM peak hour will typically be the most heavily traveled day and hour in the southbound direction, with the heaviest volumes occurring on the Interchanges 7A to 8 and 8 to 8A segments. As indicated in Table 2.12, by 2032 the traffic volumes of each segment within the Project Corridor will increase by approximately 50 to 59 percent in the northbound direction and by approximately 14 to 30 percent in the southbound direction. All segments except Interchange 6 to 7 will operate at LOS F in both directions; the Interchange 6 to 7 segment will operate at LOS E. The segment with the highest Friday PM peak hour growth from 2005 to 2032 will be between Interchanges 8 and 8A in the northbound direction, with an overall growth of 59 percent.

The Sunday PM peak hour will exhibit substantial increases in traffic volumes in both the northbound and southbound directions. As indicated in Table 2.13, by 2032 the traffic volumes of each segment within the Project Corridor will increase by approximately 61 to 76 percent in the northbound direction and by approximately 68 to 91 percent in the southbound direction. All segments in both directions will operate at LOS F.

The results of the Level of Service analysis indicate that every mainline section of the Turnpike, from the Interchange 6 ramps to Interchange 8A, are projected to operate at LOS E or LOS F in either or both directions during at least one of the peaks, indicative of almost study-area-wide operational failure. Operating speeds would be extremely low, with zero speeds occurring at times, and travel times would increase markedly. In the absence of capacity improvements, increasing travel demand will exacerbate the traffic congestion that is evident at present on the Turnpike between Interchanges 6 and 8A.

2.3.3.6 Future Travel Demand on Parallel Roadways

As traffic volumes and congestion increase on the Turnpike mainline, motorists will seek diversions to local roadways to reach their destinations. Even if the Turnpike is not widened, traffic on the Turnpike and in central New Jersey in general will continue to grow. Due to the capacity limitation imposed by the six-lane section between Interchanges 6 and 8A, as well as general growth in the region, traffic on other north-south roads will grow as well, often at faster rates than the growth in Turnpike traffic. Based on a screenline analysis prepared for the Interchange 7A to Interchange 8 segment as part of the Proposed Project's traffic analysis, traffic (both automobile and truck) on parallel sections of U.S. Route 130 and County Road (CR) 539 are generally projected to grow at substantially higher rates than on the Turnpike in this area. While Turnpike traffic is projected to grow anywhere from 25 to 90 percent for auto traffic and up to 35 percent for truck traffic, traffic on the parallel sections of U.S. Route 130 and CR 539 is projected to grow at higher rates (up to 140 percent for auto traffic and 700 percent for truck traffic on U.S. 130, and under a No-Build condition up to 160 percent for auto traffic and 2,200 percent for truck traffic on CR 539).

This represents a clear indication of the inability of this section of the Turnpike to continue serving increasing north-south travel demand in this area if the Proposed Project is not constructed. The analysis for this segment also indicates that through trips (for both automobile and truck) on U.S. Route 130 and CR 539 are projected to increase substantially, especially on U.S. Route 130, if the Proposed Project is not constructed. It is anticipated that U.S. Route 130 would become saturated with long-distance traffic that the Turnpike was explicitly built to serve.

2.3.4 Safety Issues

With increasing congestion and worsened travel conditions on the Turnpike, the likelihood of accidents will increase. When congestion increases, motorists have less room to maneuver and tend to make unsafe movements to enter and exit the roadway, resulting in a greater frequency of accidents.

Within the Project Corridor, the accident data show that high accident numbers occur between the Interchange 8 on- and off-ramps and the merge area where five lanes from the dual-dual sections north of Interchange 8A are reduced to three lanes. There is also a service area (Service Area 7S) on the southbound side of the Turnpike approximately 1.4 miles south of the southbound merge area, further complicating driving maneuvers in this area. In a speed study conducted for the Proposed Project between 2:30 PM and 7:00 PM, it was found that motorists traveling in the southbound direction and approaching the merge reduced their vehicular speed from approximately 70 mph to five mph within a distance of one mile and maintained this speed for approximately two miles. One of the adverse effects of this vehicular speed reduction is the constant acceleration and deceleration by motorists traveling in this congested area. Depending upon the length of time this condition occurs; motorists become distracted and impatient, and may also perform risky movements to change lanes.

The safety performance of the dual-dual roadway concept to reduce the number of accidents in comparison to the six-lane cross-section has been evaluated. This evaluation compares accident statistics for the current dual-dual (12-lane) cross-section (six lanes in each direction) between Interchanges 9 and 11 and the six-lane cross-section (three lanes in each direction) from Interchanges 6 to 8A using 2002-2003 accident data provided by the Authority. The results of this evaluation are shown in Table 2.14 and indicate that the dual-dual roadway configuration exhibited fewer accidents per hundred million vehicle miles (HMVM) than the section configured as a six-lane roadway. The 12-lane dual-dual section of the Turnpike had an accident rate of 60.6 accidents per HMVM and the six-lane section of Turnpike had an accident rate of 91.2 per HMVM. Therefore, the accident rate on the six-lane section was about 50 percent higher than the dual-dual section.

Table 2.14
2002-2003 Turnpike Accidents Per Hundred Million Vehicle Miles
Comparison of Six-Lane and Dual-Dual (12-Lane) Sections

Roadway Configuration	From		To		Segment Length (Miles)	Total Accidents 2 Year Period (2002-03)	Average Daily Traffic (Thousands)	Hundred Million Vehicle Miles (HMVM)	Number of Accidents Per HMVM
	Interchange	Milepost	Interchange	Milepost					
Six-Lane Cross-Section	6	51.0	7	53.3	2.3	169	110.3	0.9	91.3
	7	53.3	7A	60.0	6.7	498	121.6	3.0	83.7
	7A	60.0	8	67.6	7.6	668	133.0	3.7	90.5
	8	67.6	8A	73.7	6.1	566	138.1	3.1	92.0
Dual-Dual (12 Lanes)	9	83.3	10	88.1	4.8	408	198.3	3.5	58.7
	10	88.1	11	90.6	2.5	215	187.4	1.7	62.9
Six-Lane Cross-Section – Interchanges 6 to 8A					22.7	1,901	125.8	10.4	91.2
Dual-Dual (12 Lanes) – Interchanges 9 to 11					7.3	623	192.9	5.1	60.6

Source: The New Jersey Turnpike Authority, 2006.

2.3.5 The Turnpike as an Evacuation Route

Because the Turnpike is the major limited access highway in the state, with good connectivity to other inter- and intrastate highways, it would play an important role as a mass evacuation route during any future catastrophic event (e.g., hurricane or homeland security incident). For example, the Turnpike, through its connection with Route I-195 at Interchange 7A, would play a major role in any evacuation of the Jersey Shore to areas to the north. The section of the Turnpike in Burlington County has been designated by the State Office of Emergency Management as an official County Evacuation Route.

2.4 Mainline and Interchanges Proposed Project Need

The need for the Proposed Project is based primarily on the existing and projected congestion problems which will occur along the Turnpike mainline within the Project Corridor given existing and future traffic demand, as described in Section 2.3 above. This section describes the roadway improvements required between Interchanges 6 and 9 to address the projected congestion problems.

2.4.1 Need for Additional Roadway Capacity between Interchanges 6 and 8A

As shown in Tables 2.10, 2.11, 2.12, and 2.13, the traffic volumes along the Interchange 6 to Interchange 8A corridor are quickly nearing maximum capacity. The volume/capacity analysis performed for this corridor shows that a 12-lane (six in each direction) roadway is needed for the two segments between Interchanges 7A and 8A, and ten lanes (five in each direction) are needed for the two segments between Interchanges 6 and 7A on the Turnpike mainline in the design year of 2032. However, for reasons discussed below in Section 2.4.3, operational, maintenance and safety needs dictate that a 12-lane roadway is needed between Interchanges 6 and 7A as well.

2.4.2 Need for Widened Roadway between Interchanges 6 and 8A to be a Dual-Dual Roadway Configuration

The analysis of the 12-lane roadway (dual-dual) vs. the 12-lane roadway (six adjacent lanes in each direction without the dual-dual configuration) designs presented in Section 2.3.4 above indicates that the widened Turnpike cross-sections of five or more travel lanes needs to be a dual-dual roadway for safety reasons. The dual-dual roadway configuration allows for the separation of trucks from the majority of cars and permits a complete roadway closing for maintenance activities, thereby providing a much safer working environment. The dual-dual roadway configuration is also consistent with the roadway configuration to the north of Interchange 8A. A configuration other than the dual-dual design between Interchanges 6 and 8A presents the potential for six lane changes within the non-dual configuration that could result in driver confusion, and would severely compromise the safe operation of the Turnpike during maintenance activities and unnecessarily complicate traffic management during incidents.

The extension of the dual-dual concept would allow the Authority to properly manage the traffic flow on its facility in the high volume areas. The Authority's Automatic Traffic Surveillance and Control System (ATSCS) balances traffic between the inner and outer roadways, thereby ensuring an efficient use of available pavement. Vehicles entering the dual-dual roadway from the mainline, interchanges, and service areas are directed by means of changeable signs to the least congested roadway. The ATSCS also rapidly detects congestion due to accidents and other incidents and thereafter diverts vehicles to the other roadway. This action has resulted in the saving of substantial delays to motorists traveling on the dual-dual roadway.

2.4.3 Need for Interchange 6 to 7A Segment to Have a Three-Lane Outer Roadway

When the original Turnpike widening between Interchanges 10 and 14 occurred in the late 1960s, the outer roadways were not designed as three lanes to be restricted to commercial traffic, but were created with a three-lane cross section, similar to the inner roadways, to afford the flexibility to route traffic around points of congestion. This dual-dual design also permitted the balancing of traffic during incidents or the complete closure of one roadway for maintenance activities or incidents while maintaining traffic flow on the parallel roadway, thus enhancing safety for workers.

As discussed in Section 2.4.1, although traffic volumes only dictate the need for ten lanes (three inner lanes and two outer lanes in each direction) to carry future traffic volumes between Interchanges 6 and 7A rather than a 12-lane roadway, the operational experience of the Turnpike north of Interchange 8A has shown that the dual-dual roadway configuration operates very differently with two outer lanes as now exists between Interchanges 8A and 9 compared to the three outer lanes in the dual-dual configuration north of Interchange 9. A restricted outer roadway in both the northbound and southbound directions would affect the operation of the entire length of the future dual-dual roadway system (i.e., the existing 33-mile dual-dual roadway between Interchanges 8A and 14, in addition to the proposed dual-dual roadway between Interchanges 6 and 8A). In addition, under circumstances where an emergency requires that the inner roadway be closed and all traffic diverted to the outer roadway during the peak travel period, a two-lane outer roadway would create a substantial restriction in traffic flow resulting in significant congestion and safety concerns.

The existing two-lane outer roadway link between Interchanges 8A and 9 creates an imbalance in roadway capacities and a reduction in LOS which creates a diversion of traffic to the inner roadway, either by design or by motorist preference. In the present roadway configuration, with a two-lane outer roadway for ten miles in both directions between Interchanges 8A and 9, an excessive number of passenger cars travel the three-lane inner roadway for the entire 33-mile length in spite of the fact that the outer roadway is four lanes wide, for the most part, between Interchanges 11 and 14. This is done because motorists want to avoid having to travel in the two-lane section of the outer roadway between Interchanges 8A and 9. As a result, motorists routinely experience congestion on the inner roadway at a time and location before the outer roadways experience congestion during the commuting periods. This congestion results in additional accidents, a reduction in air quality, and unsafe maneuvers by some motorists who drive illegally through the emergency crossovers between roadways.

Where outer roadways are two lanes, there is no left-lane restriction for commercial traffic, and the traffic stream is not as fluid as the inner roadway, which has more homogeneous traffic. Without the third lane as a passing lane for passenger cars, there is more traffic flow confusion and an increased propensity for accidents involving the heavier commercial traffic which has different operating characteristics.

The dual-dual roadway design also permits the physical closing of roadways or signed diversion of traffic for maintenance activities, incidents or accidents. Currently, the diversion of traffic from the inner roadway to the outer roadway has severe impacts because of the limited two-lane capacity of the outer roadway currently between Interchanges 8A and 9. These impacts would be expected to be even more severe as the dual-dual roadway is extended to Interchange 6. When traffic is diverted to the two-lane outer roadway, there are more constraints on throughput, causing congestion to develop more quickly and take longer to dissipate when downstream conditions are returned to normal. It is not uncommon for such southbound diversions to create congestion of 20 miles or more during off-peak times. Consequently, this places a burden on nearby parallel State roadways when Turnpike traffic elects to escape the extensive congestion. In the northbound direction, incidents that occur just north of the mainline diverge will cause motorists to merge from a three-lane roadway to a two-lane roadway.

In this case, during peak periods, traffic has backed up more than 15 miles in advance of the dual-dual roadway, to the point of blocking a critical connection with the east-west I-195 roadway at Interchange 7A.

The dual-dual roadway design also enhances the safety of maintenance and construction workers along the Turnpike. Work activities are commonly coordinated with roadway closings. The two-lane outer roadways reduce the opportunity for roadway closings of the inner roadways, even at some distance from the two-lane outer roadway section, because the reduced capacity results in congestion. Thus, it becomes even more difficult to maintain an extended dual-dual roadway without significant effects on traffic flow. The allowable closings would likely be reduced because of the two-lane constraint.

The dual-dual roadway concept was designed when commercial vehicles (i.e., trucks) were not as wide or long as they are currently, had fewer points of articulation and traveled at a slower posted speed limit than they currently do. Those, among other reasons, contribute to the increasing number of accidents, and the severity and number of vehicles involved in accidents on the outer roadway. The Authority's operational experience has demonstrated that these accidents, involving longer vehicles, are more likely to completely block a two-lane roadway than a three-lane roadway. The resulting congestion on a two-lane outer roadway builds quicker and tempts motorists to use shoulders more frequently, delaying and even blocking emergency response to overturned and wrecked vehicles, and increasing response and clearance times. The response of the Turnpike's automatic traffic surveillance and control system (ATSCS) to this congestion is to divert traffic entering the system to the inner roadway, including commercial traffic, thus defeating one of the purposes of the dual-dual roadway design of separating commercial and passenger traffic.

Although projected traffic volumes justify five lanes instead of six in the segments to the south of Interchange 7A, six lanes are critical in certain locations. Interchange 7A, with ramps connecting to I-195, is the exit of choice for a major traffic generator in central New Jersey, the Great Adventure theme park. During summer months, congestion would be exacerbated in this location due to the inability of large numbers of vehicles to exit the Turnpike at Interchange 7A, because the outer roadway would be reduced from three lanes to two lanes just south of Interchange 7A.

2.4.4 Need to Implement the Third Outer Lane between Interchanges 8A and 9

As described in Section 1.4.3, the dual-dual roadway design between Interchanges 8A and 9 was constructed and opened to traffic in 1990. Although this section of the Turnpike was designed and constructed to accommodate three lanes in each outer roadway, with the intent of making the cross-section of each roadway consistent with those located to the north, only two lanes were actually constructed for each roadway at that time. However, all earthwork, bridges, drainageways, noise barriers, lighting and retaining walls were constructed to accommodate the third lane in each direction in the future. These future outer lanes are currently being utilized as roadway shoulders.

In the course of conducting the traffic analysis for the Proposed Project, the existing and projected operating characteristics of the Interchange 8A to 9 segment were evaluated because of its ten-lane dual-dual configuration (with a two-lane outer roadway instead of three). The traffic data show that, just like the Interchange 6 to 8A mainline section to the south, the 8A to 9 segment has also experienced significant growth in traffic volumes since opening. From 1990 to 2002, the 8A to 9 segment experienced a 63 percent increase in traffic volumes.[13] Table 2.15 shows the existing and projected traffic volumes, V/C ratios and LOS for the Interchange 8A to Interchange 9 segment (both northbound and southbound) for the weekday AM peak hours, weekday (not including Friday) PM peak hours, and Friday PM peak hours, respectively, assuming no change in roadway capacity (the No

[13] Wilbur Smith, 2004.

Table 2.15
Level of Service Comparison
Interchange 8A to 9

Segment	VOLUME					DENSITY, V/C & LOS					
	2005 Existing	2012 No Build		2032 No Build		2005 Existing		2012 No Build		2032 No Build	
	Volume	Volume	Change From 2005	Volume	Change From 2005	Density	LOS	V/C	LOS	V/C	LOS
Weekday (Monday-Friday) AM Peak Hour											
8A to 9 NB	7,189	8,101	12.7%	10,884	51.4%	32.2/17.3	D/B	0.76/0.75	D/D	1.02/1.02	F/F
8A to 9 SB	5,037	5,884	16.8%	7,818	55.2%	18.1/19.3	C/C	0.56/0.56	C/C	0.75/0.75	D/D
Weekday (Monday-Thursday) PM Peak Hour											
8A to 9 NB	5,094	5,871	15.3%	8,684	70.5%	N/A	N/A	0.55/0.55	C/C	0.82/0.81	D/D
8A to 9 SB	6,010	7,157	19.1%	9,175	52.7%	N/A	N/A	0.67/0.67	C/C	0.86/0.86	D/D
Friday PM Peak Hour											
8A to 9 NB	6,020	7,196	19.53%	9,664	60.5%	18.5/28.0	C/D	0.67/0.66	C/C	0.90/0.89	E/D
8A to 9 SB	7,888	8,418	6.72%	10,296	30.5%	35.1/19.5	E/C	0.78/0.78	D/D	0.95/0.95	E/E

Notes:
(1) Density is measured in passenger cars per mile per lane (pcpmpl).
(2) V/C = Volume Capacity Ratio.
(3) LOS = Level of Service.
NB = Northbound
SB = Southbound
N/A = Data not available
Source: The Louis Berger Group (2006).

Build condition). By the 2032 design year, without any capacity improvements, the northbound 8A to 9 segment will operate at LOS F in the weekday AM peak hour. The southbound 8A to 9 segment will operate at LOS E in the Friday PM peak hour. This segment will operate at LOS D or E in all other peak hour conditions.

In addition to addressing the projected congestion conditions between Interchanges 8A and 9, implementation of the third outer lane in this segment is needed to provide overall system continuity from Interchange 9 to Interchange 6 if the 6 to 8A segment is widened as proposed (i.e., there would then be a continuous 12-lane cross-section (including three lanes in each outer roadway) from Interchange 6 in the south to the existing 12-lane cross-section that begins at Interchange 9).

2.4.5 Need to Improve Interchanges Within the Widened Mainline

In order to accommodate the proposed Turnpike mainline widening and projected increased traffic volumes utilizing the roadway, the interchanges within the Project Corridor will need to be modified and/or improved, as described in Section 1.4.2. All of the toll plazas except at Interchange 8 will be retained in their current locations, and the improvements will generally consist of toll plaza widening to accommodate the additional traffic volumes, the addition and/or widening of interchange access ramps, and other minor improvements.

Interchange 8 is the only interchange that will need to be relocated. The Interchange 8 toll plaza is currently located on the southbound side of the Turnpike at Milepost 67.6 in East Windsor Township, Mercer County. The existing interchange is a standard trumpet design providing access to and from the five-lane toll plaza, the Turnpike mainline, and N.J. Route 33. The existing toll plaza is situated in relative close proximity to the Turnpike mainline, N.J. Route 33 and the Turnpike's Central Shops maintenance yard. The existing configuration of the toll plaza does not meet current Turnpike toll plaza configuration requirements for providing a 500-foot minimum distance between the toll plaza and the ramp terminals. In addition, the existing interchange interconnection with N.J. Route 33 is in close proximity to the center of Hightstown, thereby causing traffic destined to and from the Turnpike with origins west of Hightstown to travel through the downtown area. In the 1990s, NJDOT completed construction of N.J. Route 133 to circumvent the downtown area. To address these existing interchange location issues, the Interchange 8 toll plaza is proposed to be relocated to the east side of the Turnpike and the interchange ramps connected directly with N.J. Route 133 by grade-separating the existing N.J. Routes 33 / 133 signalized intersection.