5.0 ALTERNATIVES EVALUATION

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5.1 Introduction

This section presents the evaluation of alternatives to the Proposed Project. Alternatives are evaluated based on their ability to meet the Proposed Project's purpose and need as defined in Section 2.0.

Five categories of alternatives are evaluated and presented in this section, including the No-Build:

- ***No-Build Alternative*** – Under this alternative, the Authority would not implement the Proposed Project, and the Turnpike would continue to operate in its current configuration between Interchanges 6 and 9.

- ***Turnpike Roadway Cross-Section Alternatives*** – These alternatives comprise alternative cross-sections for a widened Turnpike mainline between Interchanges 6 and 8A.

- ***Turnpike Operational Alternatives*** – These alternatives comprise different ways of operating the Turnpike, including High Occupancy Vehicle (HOV) lanes, High Occupancy Toll (HOT) lanes, and Contra-Flow (Reversible) lanes.

- ***Non-Turnpike Capital or Operational Alternatives*** – These alternatives do not involve or include any improvements to the Turnpike, although other roadway or transit system improvements would be constructed. These include:
  - Improvement of existing parallel roadways.
  - Construction of a new parallel roadway.
  - Additional mass transit services beyond those currently planned.

- ***Transportation Demand Management (TDM)***.

Each of these alternatives is evaluated separately below.

5.2 No-Build Alternative

Under the No-Build Alternative, the Authority would not widen the Turnpike mainline nor make related improvements between Interchanges 6 and 8A or between Interchanges 8A and 9. There would be no change in the capacity of the Turnpike mainline or interchange ramps and toll plazas within the project limits. However, other transportation projects identified in the long-range transportation plans of the Delaware Valley Regional Planning Commission (DVRPC) and the North Jersey Transportation Planning Authority (NJTPA) would be implemented.

Under the No-Build Alternative, traffic volumes on the Turnpike would continue to increase in the future as population, employment and vehicular use increase within central New Jersey and along the Northeast Corridor between Washington, DC and Boston, MA. These increases would occur in both directions during weekday, weekend and holiday peak travel periods. Given the expected continued growth in the north-south movement of both people and goods, construction of the Pennsylvania Turnpike/I-95 Interchange, and other expected developments, congestion is expected to only worsen in future years under the No-Build Alternative.

Mainline traffic analysis was performed for the northbound and southbound Turnpike between Interchanges 6 and 9 for the 2032 No-Build Alternative during the four peak travel hours. The analysis periods included Weekday AM, Weekday PM, Friday PM, and Sunday PM. As shown in Table 5.1, the results of the analysis for these time periods (without proposed Route 92) indicate that more than half of the Turnpike segment peak hour directional combinations are projected to operate at LOS F in 2032. Based upon the analysis results, the Weekday AM peak hour in the northbound direction and the Friday PM peak hour in the southbound direction are projected to have the worst congestion along all segments of the Project Corridor.

Table 5.1
2032 No-Build Peak Hour Level of Service (without Route 92)

	Northbound				Southbound			
Segment	Weekday AM Peak Hour	Weekday PM Peak Hour	Friday PM Peak Hour	Sunday PM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour	Friday PM Peak Hour	Sunday PM Peak Hour
8A to 9	F	D	E	D	D	D	E	D
8 to 8A	F	F	F	F	F	F	F	F
7A to 8	F	E	F	F	F	F	F	F
7 to 7A	F	D	F	F	E	D	F	F
6 to 7	E	D	E	F	E	D	F	F

Table 5.2 summarizes the projected 2032 No-Build traffic volumes, LOS results and percentage increases in traffic levels in comparison to the Existing Condition for the Weekday AM peak hour in the northbound direction and the Friday PM peak hour in the southbound direction without the Authority's proposed Route 92 project, which would provide a new express connection between Interchange 8A and U.S. Route 1 in South Brunswick Township. Under the No-Build Alternative for the future design year of 2032, peak hour traffic volumes are predicted to increase by as much as 76 percent from the existing 2005 volumes. Four of the five segments in the Project Corridor are projected to operate at Level of Service F during the Weekday AM peak hour in the northbound direction and the Friday PM peak hour in the southbound direction for the No-Build condition. The other segments would operate at level of Service E.

Table 5.2
2032 No-Build Peak Hour Volumes and Level of Service (without Route 92)

	Weekday AM Northbound		**Friday PM Southbound**	
Segment	**VPH LOS**	**Change from '05**	**VPH LOS**	**Change from '05**
8A to 9	10,890 (F)	+51%	10,300 (E)	+31%
8 to 8A	8,720 (F)	+52%	8,470 (F)	+30%
7A to 8	7,960 (F)	+63%	7,550 (F)	+14%
7 to 7A	6,910 (F)	+75%	7,360 (F)	+20%
6 to 7	6,050 (E)	+76%	6,840 (F)	+21%

Table 5.3 provides similar information regarding the projected 2032 traffic volumes, LOS results and percentage increases in traffic levels in comparison to the Existing Condition, but with the Authority's proposed Route 92 project in place. Under this scenario, the same four out of five segments in the Project Corridor are projected to operate at Level of Service F during the weekday AM peak hour in the northbound direction and the Friday PM peak hour in the southbound direction as in the No-Build Condition. The other segments would also operate at Level of Service E.

Table 5.3
2032 No-Build Peak Hour Volumes and Level of Service (with Route 92)

Segment	Weekday AM Northbound VPH LOS	Weekday AM Northbound Change from '05	Friday PM Southbound VPH LOS	Friday PM Southbound Change from '05
8A to 9	11,060 (F)	+54%	10,570 (E)	+34%
8 to 8A	8,760 (F)	+53%	8,170 (F)	+25%
7A to 8	7,770 (F)	+60%	7,290 (F)	+10%
7 to 7A	6,840 (F)	+73%	7,200 (F)	+17%
6 to 7	6,020 (E)	+76%	7,020 (F)	+24%

Note: VPH = vehicles per hour; LOS = levels of service.

Without a change in Turnpike capacity, these increased traffic volumes would result in unacceptable levels of service and, therefore, substantial declines in traffic flow conditions, a higher potential for accidents, more difficulty in clearing incidents, and a longer time for traffic flow to recover from incidents.

In addition, under the No-Build Alternative, traffic flow on alternate routes to the Turnpike would progressively deteriorate as drivers who would otherwise use the Turnpike would divert from the Turnpike to alternate routes due to the severe congestion. Under the No-Build Alternative, traffic on parallel sections of U.S. Route 130 is projected to increase up to 140 percent for automobile traffic and 700 percent for truck traffic; for parallel sections on C.R. 539, traffic is projected to increase up to 160 percent for automobile traffic and 2,200 percent for truck traffic. Thus, the No-Build Alternative would lead to declines in service on both the Turnpike and on alternative north-south routes in central New Jersey.

Estimated peak hour travel times in both directions were derived from the model runs between four points near or south of the southern end of the Project Corridor (I-95 south of Wilmington, DE; Cherry Hill, NJ; Northeast Philadelphia, PA; and Trenton, NJ) and two points near or north of the northern end of the Project Corridor (New Brunswick, NJ; and I-95/George Washington Bridge, NJ/NY). Table 5.4 shows the model-estimated peak hour travel times (in minutes) for 2032, as well as the net change in travel time (minutes) between the 2032 No-Build and 2005 Existing Conditions for the Weekday AM, Weekday PM, and Friday PM peak hours. It must be emphasized that these origin-destination pairs were selected only for purposes of illustration. Many other origin-destination pairs also will experience changes in travel time, so this is by no means an all-inclusive list.

One result of worsened travel conditions is that travel times would increase on the Turnpike during peak demand periods. Under the No-Build Alternative, the travel times depicted on Table 5.4 are all projected to increase, from almost 10 minutes from Trenton to New Brunswick during the weekday

Table 5.4
2032 Model-Estimated No-Build Peak Hour Travel Times

From	To	Estimated Peak Hour Travel Time (Minutes) 2032 No-Build			Change in Peak Hour Travel Time (Minutes) 2032 No-Build vs. 2005			Percent Change 2032 No-Build vs. 2005		
		Weekday AM	Weekday PM	Friday PM	Weekday AM	Weekday PM	Friday PM	Weekday AM	Weekday PM	Friday PM
I-95, S of Wilmington, DE	New Brunswick, NJ	141	122	128	30.1	16.7	19.2	28.5%	15.8%	17.7%
	I-95/GWB, NJ/NY	194	172	178	35.9	20.3	23.5	23.6%	13.4%	15.2%
Cherry Hill, NJ	New Brunswick, NJ	100	83	88	24.9	12.9	16.1	35.6%	18.4%	22.3%
	I-95/GWB, NJ/NY	152	133	139	30.6	16.4	20.5	26.3%	14.1%	17.3%
North Philadelphia, PA	New Brunswick, NJ	101	83	87	27.4	14.2	16.1	40.1%	20.8%	22.8%
	I-95/GWB, NJ/NY	153	132	138	33.2	17.7	20.4	28.9%	15.4%	17.4%
Trenton, NJ	New Brunswick, NJ	76	57	61	18.8	9.2	11.8	39.5%	19.3%	24.0%
	I-95/GWB, NJ/NY	129	107	112	24.9	12.6	16.2	26.5%	13.4%	16.9%
New Brunswick, NJ	I-95, S of Wilmington, DE	142	144	149	23.9	26.7	28.6	20.3%	22.7%	23.8%
	Cherry Hill, NJ	85	83	88	11.0	11.3	12.5	15.3%	15.7%	16.7%
	North Philadelphia, PA	92	85	88	15.0	14.4	15.6	21.3%	20.4%	21.4%
	Trenton, NJ	65	60	63	10.4	11.2	11.8	21.5%	23.1%	23.0%
I-95/GWB, NJ/NY	I-95, S of Wilmington, DE	187	195	202	26.0	30.2	34.1	15.8%	18.3%	20.3%
	Cherry Hill, NJ	130	134	141	13.1	14.8	18.0	11.0%	12.4%	14.6%
	North Philadelphia, PA	137	135	142	22.2	17.9	20.2	18.9%	15.2%	16.5%
	Trenton, NJ	110	110	117	12.5	14.7	17.4	13.1%	15.4%	17.5%

PM peak hour, to approximately 36 minutes from I-95 south of Wilmington, DE to I-95/George Washington Bridge, with a median increase of 17.6 minutes. As a percentage of the estimated 2005 peak hour travel times, the estimated 2032 No-Build travel times are projected to be 11 to 40 percent higher, with a median increase of 19 percent.

In light of the substantial adverse effects on mobility on the Turnpike and the surrounding regional transportation network under the No-Build Alternative, this alternative does not meet the purpose and need and is, therefore, impractical. However, the impacts associated with this alternative are evaluated in this EIS in order to establish a baseline condition against which the effects of the Proposed Project can be measured.

5.3 Turnpike Roadway Cross-Section Alternatives

As indicated in Section 1.0, the Turnpike is currently a divided toll highway that operates with three travel lanes in each direction between Interchange 6 and a point about one mile south of Interchange 8A. Between Interchanges 8A and 9, the Turnpike operates as a 10-lane dual-dual highway with a three-lane inner roadway and a two-lane outer roadway in each direction.

Section 2.0 establishes the capacity needed to meet future travel demand, safety and operational requirements on the Turnpike between Interchanges 6 and 9. The analyses in Section 2.0 establish the future needed capacity as a twelve-lane roadway between Interchanges 6 and 9, with six lanes in each direction carried by two separated three-lane roadways (inner and outer), a dual-dual roadway configuration. Implicit in those analyses are the consequences of two roadway cross-section alternatives to that provided by the Proposed Project: (1) widening to twelve lanes between Interchanges 6 and 8A without separate inner and outer roadways in each direction, and (2) widening to ten lanes between Interchanges 6 and 7A, thereby addressing only the travel demand element of purpose and need between these interchanges.

Specifically, the analysis of the dual-dual vs. six-lane roadway designs presented in Section 2.3.4 indicates that Turnpike cross-sections of five or more travel lanes need to be a dual-dual roadway for safety reasons. 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 could result in driver confusion, and would hinder Turnpike operability during maintenance activities and incidents. In light of these undesirable consequences, the alternative of widening without providing separated inner and outer roadways in each direction does not meet the purpose and need and is, therefore, impractical.

As discussed in Section 2.4.1, although ten lanes are needed (five in each direction) to carry future traffic volumes between Interchanges 6 and 7A rather than a twelve-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. A restricted outer roadway in both the northbound and southbound directions between Interchanges 6 and 8A would adversely affect the operation of the entire length of the dual-dual roadway system, the existing 33-mile dual-dual roadway between Interchanges 8A and 14, as well as the proposed dual-dual roadway between Interchanges 6 and 8A. In light of these undesirable consequences, the alternative of widening to five rather than six lanes in each direction between Interchanges 6 and 7A does not meet the purpose and need and is, therefore, impractical.

5.4 Turnpike Operational Alternatives

This section evaluates the practicability of applying roadway operational (transportation system) management strategies to the Turnpike between Interchanges 6 and 8A as alternatives to the Proposed

Project. Specifically, high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, and Contra-Flow (Reversible) lanes are evaluated with respect to meeting the purpose and need.

Another set of transportation system management techniques – intelligent transportation systems (ITS) – refers to the use of information technology such as computers, telecommunications and the internet to improve the operation and efficiency of the existing transportation system. ITS has been employed and enhanced by the Authority to manage and improve operation of the Turnpike for decades through such means as electronic toll collection, automated traffic management systems, variable message signs, integrated roadside assistance programs and emergency warning systems. The Authority's use and continued enhancement of these techniques is factored into the Proposed Project. Therefore, ITS is not considered an alternative.

5.4.1 High Occupancy Vehicle (HOV) Lanes

A High Occupancy Vehicle (HOV) is a passenger vehicle that carries a specified minimum number of passengers, usually at least two or more. HOV lanes are those that are reserved for vehicles meeting the HOV criteria, including carpools, vanpools, buses, and sometimes motorcycles. The theory of HOV lanes is simply the movement of the maximum number of persons per lane rather than vehicles per lane. The main target group for HOV lanes is daily commuters, thus reducing single-occupancy vehicles (SOVs) and increasing carpools and vanpools. A logical goal of ridesharing is to conserve highway capacity, maximize use of existing facilities, and reduce energy consumption.

The concept of creating specially designated lanes for vehicles carrying a specified minimum number of passengers presumes that these vehicles will be given priority in their use of roadway space to travel at a higher speed to their destination. The destinations would presumably be destinations with sufficient trip generation (or attraction) potential to develop a major flow. A second requirement for this type of operation is that one lane can be closed to general traffic for the peak period (AM and PM). Only vehicles with the required number of passengers are permitted to use the priority lane during the designated hours. This presumes that the roadway would be sufficiently loaded and that the non-HOV lanes would be slowed while the HOV lane would have sufficient capacity to handle the HOVs at or near design speed. HOV lanes are most effective where there are consistently high levels of congestion in non-HOV lanes, and where many vehicles travel between a common set of origins and destinations to allow ridesharing.

HOV lanes can be implemented by adding new roadway capacity designated specifically for HOVs or by converting existing travel lanes or shoulders. HOV lanes can be separated from regular traffic using signs, pavement markings, painted buffers or physical barriers. Some HOV lanes operate 24 hours per day, while others are designated only during specified periods. Some HOV lanes are reversible and are used to carry traffic in the peak direction.

The use of HOV lanes as a transportation systems management strategy is not new; these types of programs have been implemented with varying levels of success in many states, including New Jersey. For example, HOV lanes (one in each direction) have been in place on the Turnpike between Interchanges 11 and 14 since the completion of the Interchange 11 to 15E Widening project in the early 1990s. These lanes were designated as HOV lanes in an effort to improve air quality by reducing single-occupant vehicle usage when the Turnpike between Interchanges 11 and 15E was widened to add a fourth lane to the outer roadway, rather than having an existing general use lane converted to an HOV lane. Only vehicles with three occupants, or hybrid vehicles, are permitted to use the lanes on weekdays between 6:00 and 9:00 AM and 4:00 and 7:00 PM.

HOV lanes were designated by the New Jersey Department of Transportation (NJDOT) on portions of I-80 (between NJ Route 15 and I-287 beginning in March 1994) and I-287 (between I-78 and I-80 beginning in January 1998) when these roadways were widened with an additional lane in each direction. However, because of public outcry over the imbalance of usage between the HOV and general use lanes, and the resulting congestion on the general use lanes, NJDOT removed the HOV designation from the added lanes on both roadways on November 30, 1998. In another example, HOV lanes have been in place on the approach to the George Washington Bridge and Holland Tunnel for a number of years, primarily for the purpose of "rewarding" HOVs with a bypass of peak hour queues rather than as a way to better use roadway capacity.

There are two key reasons why HOV lanes are not a practical alternative to the Proposed Project, either to obviate the need for any widening or to reduce the required number of lanes to serve future demand on the Turnpike. First, even during peak periods, the Turnpike carries relatively large percentages of single-occupant, non-commuter passenger cars (i.e., passenger cars making through trips or business or leisure trips) and relatively large proportions of commercial vehicles. Neither of these types of trips can take advantage of HOV lanes. Second, for commuters, there are numerous trip origins and destinations in central New Jersey with no major employment destination along the Turnpike between Interchanges 6 and 8A. In other words, the potential for ride-sharing to reduce single-occupant commuter passenger cars is limited, even more so than along the I-80 and I-287 corridors where HOV lanes proved highly unpopular.

To create HOV lanes in both directions of the Turnpike in lieu of any widening would require the conversion of one of the three general purpose lanes in each direction during peak periods. Under this scenario, converting one general purpose lane to HOV use during peak periods would be implemented instead of a widening, and in light of the factors outlined in the previous paragraph, congestion would increase in the two remaining general purpose lanes as overall roadway capacity for non-HOVs would decrease, and the purpose and need would not be met. On the New Jersey Turnpike, capacity is considered to be 1,850 passenger car equivalents per hour per lane. Therefore, to lessen the need for the widening by even one lane, approximately 1,850 SOVs would need to convert to HOVs. This level of conversion is highly unlikely given the factors outlined above and the response by drivers to HOVs in prior efforts by the State to induce ridesharing through HOV lanes. Indeed, the implementation of HOV lanes as part of the prior Interchanges 11 to 15E Widening did not lessen the extent of that widening as proposed.

Substantial travel demand reductions would only occur with HOV lanes if the underlying residential and employment demographics indicate the potential for a sizeable increase in ridesharing. Simply allowing existing high occupancy vehicles to use a priority lane does not reduce total vehicular demand. Given the highly-dispersed patterns of residential and employment development in central New Jersey, it is not reasonable to assume that implementation of HOV lanes would satisfy the underlying purpose and need for the project. Even if HOV lanes could reduce the number of needed lanes by one, the adverse operational issues related to a two-lane roadway under the dual-dual configuration would occur. For these reasons, the use of HOV lanes is impractical as an alternative to the Proposed Project.

5.4.2 High Occupancy Toll (HOT) Lanes

HOT (High Occupancy Toll) lanes are HOV facilities that also allow low-occupancy vehicles to use them if drivers are willing to pay a premium. HOT lanes generally allow more vehicles to use existing HOV lanes while still maintaining an incentive for commuters to shift to alternative travel modes. HOT lanes are seen as a compromise between HOV lanes and Congestion Pricing (see Section 5.6.1.1), and generally make HOV lanes more attractive to low occupancy vehicles and as a means to generate revenue. When using a particular facility with HOT lanes in place, commuters generally have three options:

- Drive alone on a free but potentially congested general purpose (non-HOT) lane;
- Drive alone but pay to use a less congested (HOT) lane; or
- Rideshare (carpool, vanpool or transit) to use a less congested (HOT) lane without any additional fee.

The issues associated with implementation of HOT lanes as an alternative are similar to those of HOV lanes. Generally, the travel impact of HOT lanes often depends on the price structure used. In addition, unlike HOV lanes, HOT lanes require a variety of logistical and enforcement issues not faced by HOV lanes, including collection of tolls by means of a reconfigured toll plaza. Since HOT lanes do not serve to reduce the number of vehicles using the Turnpike, unacceptable levels of congestion would likely remain in the general purpose lanes, although to a lesser degree than under the HOV lane alternative. Moreover, even if HOT lanes could reduce the number of needed lanes by one, the adverse operational issues related to a two-lane roadway under the dual-dual configuration would occur. For these reasons, the use of HOT lanes is impractical as an alternative to the Proposed Project.

5.4.3 Contra-Flow Lanes

Contra-flow (or reversible) lanes provide flexibility that enables traffic to flow in either direction, depending on prevailing conditions. Contra-flow lanes are commonly found on highways at tunnel and bridge crossings. Some contra-flow lanes can be controlled by a moveable barrier to establish a physical separation between streams of traffic. In some systems, a concrete barrier is moved during peak periods to switch a central traffic lane from one direction to the other. Some examples of this system include the Coronado Bridge in San Diego, California and the Tappan Zee Bridge in New York. Other contra-flow systems use retractable cones or bollards which are built into the road, or retractable fences which can divert traffic from a reversible ramp. For example, the two center lanes of the six-lane Golden Gate Bridge in San Francisco are reversible (southbound during morning rush hour and northbound at evening rush hour) and are separated from opposing traffic with vertical flags.

The I-495 and Lincoln Tunnel Exclusive Bus Lanes (XBL) provide another example. In 1970, a single through XBL was established on I-495 westbound for eastbound vehicles through the Lincoln Tunnel, providing a seamless bus lane from the New Jersey Turnpike to the Port Authority Bus Terminal in Manhattan during the AM peak period. The XBL is a dedicated contra-flow bus lane that is 2.5 miles long and operates weekday mornings between 6:15 AM and approximately 10:00 AM. The purpose of the XBL is to facilitate the use of mass transportation between New Jersey and New York City. The XBL was designed as a coordinated effort among three transportation agencies – the Port Authority of New York and New Jersey (PANYNJ), the New Jersey Turnpike Authority and NJDOT. After the first year of operation, the XBL became a permanent condition under the jurisdiction of PANYNJ.

Due to the length of the portion of the Project Corridor between Interchanges 6 and 8A (over 22 miles) where a contra-flow lane could potentially be considered, moving a directional separation barrier twice each weekday to create a contra-flow lane would be extremely time consuming and expensive. A piece of specialized machinery can move about two miles of barriers per hour. In addition, contra-flow lanes are most effective when traffic flows during a particular time period are predominately in one direction. The traffic analysis for the 2012 and 2032 Build Years indicates that volumes on the Turnpike will be relatively balanced in both directions throughout the day. For example, the travel model projects that the northbound percentage of 2032 No-Build Weekday AM peak hour traffic volumes on the Turnpike mainline on links between Interchanges 6 and 8A varies from 49 percent to 57 percent, indicating the lack of pronounced directionality in peak hour travel demand. Southbound volumes are higher than northbound volumes between Interchanges 6 and 7 during the AM peak hour. Therefore, deploying a contra-flow lane by converting a southbound lane into a northbound lane during the AM peak period, would negatively affect traffic flow in the opposing traffic direction and thereby, not accomplish the purpose and need. For this reason, the use of contra-flow lanes is an impractical alternative to the Proposed Project.

5.5 Non-Turnpike Capital or Operational Alternatives

5.5.1 Improve Existing Parallel Roadways

There are two major parallel routes to the Turnpike between Interchanges 6 and 9. These are U.S. Route 1 and U.S. Route 130. In addition, since a portion of I-295 parallels the Turnpike between the Turnpike's southernmost limit and a point roughly between Interchanges 7A and 8, and since it connects to both U.S. Route 1 and U.S. Route 130, improvements to I-295 can be viewed as a component of an alternative involving either of these routes but not as a stand-alone alternative. It should be noted, however, that the Pearl Harbor Memorial Turnpike Extension – future I-95 – is served by U.S. Route 130 but not by I-295. Although U.S Route 206 does parallel the Turnpike between Interchanges 6 and 9, intersecting at Interchange 7, improvements to this roadway are not considered as an alternative because it serves predominately different origins and destinations than those of the Turnpike, serves even higher proportions of local trips than U.S. Routes 1 and 130, and also traverses densely developed areas like Trenton and Princeton.

5.5.1.1 Improve U.S. Route 1

U.S. Route 1 in New Jersey is 66.1 miles long between the Trenton-Morrisville Bridge in Trenton and the George Washington Bridge in Fort Lee. Across New Jersey, U.S. Route 1 generally alternates as a four-lane and six-lane principal arterial highway, with speed limits ranging from 30 to 55 mph. Between Woodbridge and Fort Lee, U.S. Route 1 and U.S. Route 9 merge to become U.S. Routes 1/9.

The function and characteristics of U.S. Route 1 were reviewed to determine if roadway improvements could be implemented to enable this route to serve the same role in the regional transportation system as the Turnpike. The Turnpike serves through movements, inter-regional commutation, and the trucking industry on a limited access alignment with high design speeds. U.S. Route 1 is a limited access roadway between the Pennsylvania Turnpike and just north of Trenton, including an interchange with existing I-95 in between. From that point, U.S. Route 1 functions primarily as a local, land-access highway and, secondarily, supports through traffic movements for much of its length between Trenton and Fort Lee. For much of its length, U.S. Route 1 has numerous signalized intersections and curb cuts for side streets and driveways serving residential and commercial land uses.

Since U.S. Route 1 functions differently and serves a different role in the regional traffic network than the Turnpike, adding capacity along this route would not provide the infrastructure required to accommodate inter-regional through traffic. Converting U.S. Route 1 to a limited access highway with sufficient capacity to carry traffic volumes in lieu of a widened Turnpike would result in substantial reconstruction and associated impacts between Trenton and New Brunswick, at which point traffic could "cross over" to the Turnpike via NJ Route 18 to Interchange 9 in East Brunswick. In addition to widening for through travel capacity, it is likely that flanking service roads would need to be constructed to maintain access to businesses and residences. These same issues occur with a U.S. Route 1 alternative even if the alternative were to include improvements to I-295. For these reasons, the alternative of widening U.S. Route 1 is impractical as an alternative to the Proposed Project.

5.5.1.2 Improve U.S. Route 130

U.S. Route 130 is approximately 83.5 miles long between the junction of I-295 and U.S. Route 40 at Deepwater and U.S. Route 1 at North Brunswick. Along the U.S. Route 130 corridor, two through travel lanes, serving both through and local traffic, are provided in each direction. Auxiliary lanes, such as left turn bays, are provided at major intersections. Shoulders are provided adjacent to both the median and the curb lanes. The posted speed limit on U.S. Route 130 is 50 mph where it parallels the Turnpike between Interchanges 6 and 9.

The function and characteristics of U.S. Route 130 were reviewed to determine if improvements could be implemented to enable this route to serve the same role in the regional transportation system as the Turnpike. Like U.S. Route 1, U.S. Route 130 traverses New Jersey primarily as a local, land-access highway and, secondarily, to carry through traffic. There are also numerous signalized intersections and curb cuts for driveways and side streets serving residential and commercial land uses.

Since U.S. Route 130 functions differently and serves a different role in the regional traffic network than the Turnpike, adding capacity along this route will not provide the infrastructure required to accommodate inter-regional through traffic. Converting U.S. Route 130 to a limited access highway with sufficient capacity to carry traffic volumes in lieu of a widened Turnpike would result in substantial reconstruction and associated impacts between at least Bordentown and either NJ Route 32 in South Brunswick, at which traffic could "cross over" to the Turnpike at Interchange 8A, or U.S. Route 1 in North Brunswick, at which point traffic could "cross over" to the Turnpike via U.S Route 1 and NJ Route 18 to Interchange 9 in East Brunswick. In addition to widening for through travel capacity, it is likely that flanking service roads would need to be constructed to maintain access to businesses and residences. These same issues occur with a U.S. Route 130 alternative, even if the alternative were to include improvements to I-295. For these reasons, the alternative of widening U.S. Route 130 is impractical as an alternative to the Proposed Project.

5.5.2 Construct a New North-South Limited-Access Roadway Alternative

After the completion of the Turnpike in 1952, New Jersey state highway officials focused on the construction of a limited-access highway, parallel to U.S. Route 1, to serve medium- and long-distance traffic in the Philadelphia to New York corridor. This highway was called the Somerset Freeway and it was to carry I-95 through central New Jersey from Hopewell in Mercer County to Piscataway in Middlesex County. Several alignments for the Somerset Freeway were proposed during the 1950s and 1960s. In 1980, NJDOT withdrew its support for the Somerset Freeway and recommended that the route be de-designated. The FHWA agreed and both the 29-mile-long I-95 through central New Jersey and its three-mile long I-695 spur were de-designated in January 1981. The construction of the new Pennsylvania Turnpike (I-276)/I-95 interchange will enable re-designation of the Pennsylvania Turnpike east of this interchange, the Pearl Harbor Memorial Turnpike Extension, and the Turnpike north of Interchange 6 to I-95, thereby better rationalizing the regional roadway network.

The difficulty encountered by NJDOT in gaining approval and community acceptance of the Somerset Freeway, and its eventual abandonment, is an example of the impracticality of constructing a new limited-access highway on a new alignment in central New Jersey.

5.5.3 Mass Transit

5.5.3.1 Existing and Planned Mass Transit Service

There is an existing extensive system of rail and bus service in New Jersey. A large part of this system is oriented to northern New Jersey and Manhattan-bound commuters and, secondarily, to Philadelphia commuters with many trips using the Northeast Corridor for passenger rail. Other services, primarily bus, provide local service and connect communities within New Jersey. The primary provider of mass transit services in the state is New Jersey Transit (NJ Transit). NJ Transit is the nation's largest statewide public transportation system, providing bus, rail and light rail services of over 800,000 daily trips on 238 bus routes, 11 commuter rail lines, and three light rail lines. NJ Transit links major points in New Jersey, New York and Philadelphia, serving 162 rail stations and 20,000 bus stops.[1]

In Middlesex County, there are several commuter bus routes operated by Suburban Transit, owned by Coach USA. Three bus routes provide service between the Interchange 8A park-and-ride facility and the Port Authority's Manhattan Bus Terminal via the New Jersey Turnpike. A fourth route originates in Princeton, Mercer County, and travels north on N.J. Route 27, through Middlesex County, en route to New York. Additionally, NJ Transit provides bus service from New Brunswick and various towns in Middlesex County to northern New Jersey. In Mercer County, there are several commuter bus routes operated by Suburban Transit that provide service between the Greater Trenton Area and Manhattan Port Authority Bus Terminal via U.S. Route 130, the New Jersey Turnpike, and N.J. Route 27. SEPTA (Southeastern Pennsylvania Transportation Authority) also operates one bus route between Trenton and Philadelphia. Bus service in Burlington County is primarily operated by NJ Transit. Most of these NJ Transit bus routes provide service between various locations in Burlington County and locations in adjacent counties and Philadelphia.

The Northeast Corridor (NEC) carries a mix of high-speed inter-city train services (Amtrak), commuter rail operations operated by eight commuter authorities including NJ Transit, and freight rail services operated by seven different railroads. The NEC is the busiest passenger rail corridor in the country in terms of service frequency and passengers moved. The 460-mile long NEC is fully electrified and serves a densely urbanized corridor from Washington, DC to Boston that also includes the cities of Baltimore, Philadelphia and New York. The busiest section of the NEC is in New Jersey where Amtrak trains share track space with two NJ Transit commuter rail lines, the Northeast Corridor Line and the North Jersey Coast Line. Each weekday, over 55 round-trip Amtrak trains and several hundred NJ Transit trains operate along this section of the NEC. The NEC parallels the Turnpike in central New Jersey to the west, generally between U.S. Route 1 and U.S. Route 130.

NJ Transit is proposing several major capital projects that are planned to serve potential future transit demand within the NEC and on new rail lines that would feed the NEC. These projects are described briefly below. While these projects will affect transit vs. automobile travel mode choice to a certain extent in central New Jersey, the projects do not affect the need for the Proposed Project because: (1) the primary overlap between mass transit and the Turnpike travel demand is commuters, whereas non-commuter and commercial vehicles comprise a large portion of Turnpike travel demand; (2) NJ Transit rail service will remain oriented primarily toward the Manhattan and northern New Jersey (Newark and Hudson River Waterfront) commuter whereas the Turnpike serves these commuters as well as commuters with more dispersed destinations; and (3) the planned new mass transit services in central New Jersey, such as the U.S. Route 1 Bus Rapid Transit, the Monmouth-Ocean-Middlesex Line, and the West Trenton Line, serve corridors well to the east and west of the Turnpike, specifically, the U.S. Route 1, U.S. Route 9, and U.S. Route 206 corridors, respectively.

Access to the Region's Core (ARC)

NJ Transit, in partnership with the Port Authority of New York and New Jersey, is currently preparing the Access to the Region's Core Draft Environmental Impact Statement (ARC DEIS). The ARC DEIS builds on findings of a Major Investment Study (MIS) completed in April 2003, which identified and evaluated alternatives that would increase passenger capacity across the Hudson River between New York and New Jersey. The primary goal of the ARC project is to meet the New York metropolitan region's mobility needs through the development of a new rail tunnel and new rail station at 34th Street, both designed to increase rail capacity across the Hudson. The Trans-Hudson Express (THE) Tunnel project will include several components:

[1] NJ Transit Department of Strategy, Policy and Analysis, February 16, 2006. *NJ Transit Facts at a Glance*.

- Two new tracks under the Hudson River and Palisades.
- A new six-track passenger station under 34th Street in Manhattan.
- Improvements in New Jersey to provide a one-seat ride to Manhattan for NJ Transit riders using the Raritan Valley, Main/Bergen, and Pascack Valley Lines.
- A rail storage yard in Kearny, NJ.

The ARC project will allow NJ Transit to schedule more trains into Penn Station and allow the trains to dwell for longer periods of time. Ultimately, this will allow NJ Transit to increase the number of trains operating on most of its rail lines west of the Hudson River. It will also allow NJ Transit to add new direct commuter rail service to midtown Manhattan through various initiatives including the opening, re-opening or upgrading of the Monmouth-Ocean-Middlesex, West Trenton, Lackawanna Cutoff and West Shore rail lines.

Monmouth-Ocean-Middlesex Rail Line

From 1990 to 2000, the total population of Monmouth, Ocean, and Middlesex counties has increased nearly 12 percent, from 1,658,107 to 1,876,379. During the past three decades, thousands of people in the New York-New Jersey metropolitan area have relocated south to Monmouth, Ocean and Middlesex counties. However, many residents continue to work in the urban areas to the north including northern New Jersey and Manhattan, placing heavy demands on the existing highways, commuter rail and bus services in the tri-county area. As one of the fastest growing areas in New Jersey, there is a need to address increasing congestion and delays on area roadways.

Two existing NJ Transit rail lines, the Northeast Corridor Line and North Jersey Coast Line, serve only the perimeters of the Monmouth-Ocean-Middlesex region, thus leaving many areas without direct rail service. Bus service has continued to evolve (especially along the U.S. Route 9 corridor), but has been unable to meet the growing travel demand in the region.

In 1996, the *Monmouth-Ocean-Middlesex (MOM) Major Investment Study* was undertaken to determine what transportation investment was needed in the primary study area. In January 2003, NJ Transit completed the *Monmouth-Ocean-Middlesex (MOM) DEIS*, which analyzed various rail alternatives for this three-county region. Work and public outreach for the MOM Study continues as officials finalize selection of a preferred alternative and secure funding for the project.

West Trenton Line

The West Trenton Line Rail Study is being undertaken by New Jersey Transit to examine the feasibility of restoring 27 miles of commuter rail service along the West Trenton Line from the SEPTA West Trenton Station in Ewing Township, Mercer County, north to the New Jersey Transit Bridgewater Station in Bridgewater, Somerset County. At Bridgewater, the proposed West Trenton Line would connect with the existing Raritan Valley Line, thus providing service into Newark Penn Station and connection to the NEC. The proposed alignment of the West Trenton Line would travel northeast through Mercer County and Somerset Counties and new stations are proposed at I-95 in Hopewell Township, Hopewell Borough, Belle Mead in Montgomery Township and Hillsborough.

Restoration of the West Trenton Line would include the re-installation of previously removed track and the installation of 12.8 miles of new track within the existing rail right-of-way. Other improvements include signal upgrades, restoration of the at-grade crossing of the Lehigh Line at Port Reading Junction, four new stations with parking facilities, a train storage yard, and acquisition of additional train rolling stock. Work and outreach for the West Trenton Line Rail Study continues as officials complete the environmental review process.

Central New Jersey Route 1 Bus Rapid Transit Alternatives Analysis

As described in Section 5.5.1.1, U.S. Route 1 operates parallel to the Turnpike and approximately seven miles to the west. Over the last two decades, the U.S. Route 1 corridor has experienced considerable growth and increasing traffic congestion. During the next 15 years, traffic volumes are projected to increase by as much as 55 percent, vehicle hours of travel are projected to increase by 118 percent, and average roadway travel speeds are projected to decrease by 29 percent.

To address the future growth and needs in the U.S. Route 1 corridor, NJ Transit, in conjunction with NJDOT, DVRPC, and NJTPA undertook an Alternatives Analysis (AA) in 2004 to fully document the transportation issues in the corridor from Trenton to North Brunswick and to develop strategies to address and improve mobility along the corridor and in the region. Solutions focused on the implementation of a Bus Rapid Transit (BRT) system and related technologies and improvements to the existing Princeton Branch train service (Dinky), which connects the Princeton Junction Station with Princeton Borough and Princeton University.

BRT attempts to combine the advantages of a light rail or heavy rail, exclusive rights-of-way and high frequency of service, with the advantages of a traditional bus system, including low construction and maintenance costs and flexible routes. When compared to standard bus service, a BRT system with a dedicated right-of-way can generally provide more passenger-miles with the same number of buses and personnel. BRT also has fewer stops than regular bus service.

5.5.3.2 Additional Mass Transit Service Alternative

As part of the planning process for its long-range capital project which produced the above-identified projects, among others, NJ Transit applied a transit score technique that evaluated the various portions of the State with respect to transit service potential, including the market potential for sustainable transit service. The transit score reflects an area's transit service potential based on a formula that accounts for an area's population density, employment density, and automobile ownership. Areas of the State were categorized as having low, medium or high transit potential based on the results of applying the formula to area-specific values, with a range of potential services from non-scheduled or demand response transit services (low potential) to heavily-used scheduled transit services, including commuter rail (high potential).

Areas of the State traversed by the Turnpike between Interchanges 6 and 8A are categorized by the transit score as having low transit service potential. This suggests that population and employment densities along the Turnpike in this area are insufficient to justify substantial investment in transit services. Demand on the order of 40 buses carrying 50 passengers each would be needed to reduce the need for the widening by one lane (1,900 passenger car equivalents per hour). Such demand or anything near it is not expected based on demographic and employment trends in central New Jersey. It can be concluded that providing additional transit services beyond those identified in the NJ Transit long-range capital plan would not meet the purpose and need and, therefore, are impractical as alternatives to the Proposed Project.

Under its enabling legislation, the Authority is not provided with any powers to engage directly in mass transit operations. However, within the scope of its enabling legislation, the Authority does provide support to mass transit in two ways. First, the Authority permits both commuter and inter-city buses to utilize the left lane of the outer roadway where there is a dual-dual configuration. All other heavy vehicles are prohibited from the use of this lane. The effect of this is to provide an additional travel lane for buses and, thereby, reduce travel times for buses on the Turnpike. Second, commuter bus tolls are lower than those for other vehicles in their weight class, and commuter bus tolls have remained relatively constant when other toll increases have been implemented. The effect of this policy has been to lower the relative overall cost of bus travel versus automobile travel. The Authority will continue to work closely with transit providers in their use of the Turnpike, as appropriate.

5.6 Transportation Demand Management (TDM)

Transportation Demand Management (TDM) strategies are designed to reduce the need to travel, increase vehicle occupancy, encourage the use of alternative modes of travel, and shift trips outside of peak periods of travel. TDM strategies accomplish this by changing personal travel behavior in order to increase the efficiency of the transportation system. Among the goals of TDM are to reduce traffic congestion, increase safety, improve mobility, conserve energy, and reduce pollution emissions.

There are many different TDM strategies. Some improve the transportation options available to consumers, while others provide an incentive for people to change their travel mode, time of travel or destination. Many TDM measures focus on addressing peak hour travel situations by reducing either the total number of trips or the number of SOV trips taken during the peak hours. Some common TDM strategies include park-and-ride lots, carpools/vanpools, flexible work hours, telecommuting, transit services and parking management alternatives. TDM measures most effectively reduce traffic congestion in areas that are heavily populated and located near major employment centers.

Commonly-considered TDM measures are described in subsequent paragraphs. It should be noted that some of the TDM strategies described below are in use in central New Jersey now and, therefore, their effectiveness is reflected in existing condition traffic volumes.

5.6.1 Descriptions of Commonly-Considered TDM Measures

5.6.1.1 Congestion Pricing

Congestion pricing is a mechanism that charges drivers variable toll rates depending on the degree of road congestion. Higher toll rates are charged during peak congestion periods and lower rates are charged during periods of less congestion. Pricing can be based on a pre-determined fixed schedule or on a dynamic rate that changes with the level of congestion.

The Authority implemented the first variable pricing program on the Turnpike in the fall of 2000. Under this program, tolls are about seven percent higher during peak traffic hours than during off-peak periods for users of the electronic toll collection system. Price changes and differentials are scheduled to increase in a phased manner over several years. According to findings from the FHWA, the introduction of variable tolls on the Turnpike has improved traffic flow and provided associated air pollution and energy consumption benefits. The FHWA’s preliminary data show that value pricing has slowed traffic growth during peak periods, and that the majority of recent traffic growth on the Turnpike has been during off-peak hours. Total traffic on the Turnpike since implementation of variable tolls is up nearly seven percent. However, AM peak period traffic is up only six percent and PM peak period traffic is up only four percent. Additionally, the proportion of daily Turnpike traffic accounted for by the AM and PM peak periods has dropped from 14 percent to 13.8 percent, and from 14.7 percent to 14.3 percent, respectively.

The implementation of congestion pricing on the Turnpike has brought about modest reductions in the rate of traffic growth during the AM and PM peak periods. The potential for additional congestion pricing through the use of HOT lanes was evaluated in Section 5.4.2.

5.6.1.2 Ridesharing (Carpools/Vanpools)

Ridesharing refers to strategies that encourage carpooling and vanpooling. Carpooling refers to the arrangement of a group of commuters that rideshare in a participant's vehicle. Vanpools are generally similar to a carpool; however, instead of using a participant's automobile, the group uses a van that can be supplied by employers, non-profit transportation advocacy groups or government agencies, with operating costs typically divided among group members and sometimes subsidized by the state and federal government. Depending upon the type of vehicles used, the capacity of a vanpool can be higher than a carpool. Carpools and vanpools tend to be most effective when they run on pre-determined fixed schedules and the number of occupied vehicle seats is maximized.

5.6.1.3 Shuttle Services

Shuttles are a form of public transit and include the use of small vans and buses to provide mobility to the public. One type of shuttle is a circulating shuttle, which makes short trips that connect passengers to major activity centers, especially during peak congestion periods. A second type of shuttle service is demand-response paratransit, which includes flexible route transit service that functions more efficiently than fixed transit service in lower-density areas and during off-peak hours. This type of service is especially useful for persons with limited mobility or disabilities. In addition, mobility-to-work services offer reverse commute shuttle services to lower-income residents who must travel to the suburban work centers and tend to be publicly funded.

5.6.1.4 Park-and-Ride Facilities

Park-and-ride facilities are parking lots strategically located near transit hubs and highway interchanges to encourage public transportation and rideshare usage mainly by commuters. These facilities tend to be located near the edges of urban centers and generally provide free parking or charge lower fees compared to parking lots within the urban core. Park-and-ride facilities can also be coupled with HOV lanes as a means to maximize SOV reduction in a corridor.

In order for park-and-ride facilities to reduce SOVs on the Turnpike to a level that would make a substantive difference in peak traffic flows, a critical mass of people needs to be intercepted at points along the highway corridor. However, since there are numerous trip origins and destinations in central New Jersey with no major employment destination along the Turnpike between Interchanges 6 and 8A, the implementation of park-and-ride lots as a sole means of supplanting the Proposed Project is not a practical alternative.

5.6.1.5 Transit Oriented Development (TOD)

Transit Oriented Development (TOD) is a planning concept for neighborhood development that incorporates design elements to encourage public transit, walking, bicycling and other forms of alternative transportation. TOD generally consists of high density residential development and commercial centers strategically placed around a transit hub (a train station or intermodal center) to increase transit accessibility. To encourage pedestrian activity, TOD neighborhoods are designed with a diameter of one-quarter to one-half mile.

In New Jersey, the NJDOT and NJ Transit, with support from the NJ Department of Environmental Protection, NJ Department of Community Affairs/Office of Smart Growth, NJ Arts Council, NJ Commerce Commission, NJ Economic Development Authority, NJ Redevelopment Authority, NJ Housing and Mortgage Finance Agency, and Main Street New Jersey, developed the Transit Village Initiative to encourage TODs. A Transit Village designation is awarded to communities that have revitalized the quarter- to half-mile radius around a transit station and that meet the criteria for a TOD set forth by the NJDOT and NJ Transit. Since 1999, 17 communities in New Jersey have been designated as Transit Villages.

5.6.1.6 Freight Transport Management

Freight Transport Management refers to a variety of logistical approaches to improve freight and commercial transportation efficiency while reducing congestion along major highway routes. Given that freight logistical decisions tend to focus on bottom line shipping costs, freight transport management is aimed at encouraging shippers to make operational changes that also take into account social and environmental costs. Congestion reduction management techniques include promoting goods distribution clusters that increase accessibility while decreasing travel time and reducing the number of heavy vehicles on the roadways. Another technique is implementing fleet management programs that optimize vehicle haul loads, reduce vehicle mileage traveled, and advance vehicle safety measures that reduce congestion, pollution and accidents.

5.6.2 Additional TDM Alternative

Planning for future TDMs is incorporated as part of the State's overall transportation planning and policy-making, in which the Authority actively participates. The effectiveness of anticipated future TDMs is already factored into the regional travel demand modeling which forms the basis for the future Turnpike traffic projections. The Authority will continue to work with counterpart transportation and planning entities toward collective ways to manage transportation demand in the State and beyond. However, because of factors such as the highly dispersed nature of travel in central New Jersey, the lack of population and employment density in areas surrounding the Turnpike between Interchanges 6 and 9, and the large proportion of Turnpike users that are largely outside the typical target audience of TDM measures, additional TDM measures would not substantially reduce future travel demand on the Turnpike and, therefore, do not meet the purpose and need for the Proposed Project. For this reason, additional TDM measures are impractical as an alternative.