4.0 ENVIRONMENTAL IMPACTS AND MITIGATION

4.0 ENVIRONMENTAL IMPACTS AND MITIGATION

4.1 Introduction

This section discusses the anticipated environmental consequences, both short-term and long-term, as well as both beneficial and adverse, that could potentially result from the construction of the Proposed Project's Initially Preferred Alternative (IPA), compared to the No-Build Alternative. This impact assessment presents the environmental resources/disciplines in the same order that they were presented in Section 3.0, Description of the Affected Environment. Also, as in Section 3.0, the discussion of each environmental resource/discipline generally presents the data sources and methodology used in identifying and assessing impacts, as well as presenting the actual results of the impacts evaluation for the No-Build Alternative, followed by the results of the impacts evaluation for the Proposed Project. In the case of adverse impacts, potential mitigation measures are also presented. The Proposed Project's final design phase will seek to further avoid, minimize, and/or mitigate any unavoidable adverse impacts to resources.

4.2 Land Use and Zoning

4.2.1 Introduction

Land use is a major expression of the relationship between people and their physical environment. Impacts to land use resulting from highway construction are either direct or indirect. A direct impact occurs when land is actually acquired for new right-of-way or other purposes, or if an easement is purchased on a portion of a parcel for such purposes as embankments, drainage, construction staging or utility relocation. An indirect, or induced impact, is defined as an impact resulting from a project at a later point in time or farther removed in distance. An example of an indirect land use impact resulting from highway construction is the development that could occur in an area as a result of improved highway access.

4.2.2 Data Sources and Methodology

Similar to the existing conditions analysis, local planning and community development officials in each of the 11 municipalities located in the Project Corridor were interviewed, and master plans, zoning maps and any special studies were obtained in order to identify proposed or approved developments in the area, as well as existing or proposed public policy actions that could affect future land use in the corridor.

The compatibility of the Proposed Project with surrounding land uses, its consistency with local zoning and master plans, as well as with the *New Jersey State Development and Redevelopment Plan*, and the potential for induced residential, commercial, and industrial development were evaluated.

In order to calculate property acquisitions, the Proposed Project's preliminary design plans were examined. These plans depict existing property lines within the limits of the Project Corridor, the existing Turnpike right-of-way line and local road rights-of-way, as well as proposed right-of-way lines and slope limits. Areas of proposed property acquisition were then digitized and compiled by land use type and by municipality.

4.2.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently,

there would be no direct or indirect impact to existing land use patterns, although proposed and approved developments within or in close proximity to the Project Corridor would likely occur independent of the Proposed Project. Proposed and/or approved developments are identified below.

4.2.3.1 Mansfield Township

There is one proposed development project located in close proximity to the Project Corridor in Mansfield Township. Located on the north side of Columbus-Kinkora Road on Block 51.10, Lot 4.01, adjacent to the southbound side of the Turnpike (M.P. 51.0), the project has received preliminary site plan approval for nine single-family dwellings.

4.2.3.2 Bordentown Township

There is one approved development project located in the Project Corridor in Bordentown Township. A 645,120 square-foot warehouse is to be located on the north side of Old York Road on Block 137.02, Lot 11.03, approximately 200 feet from the southbound side of the Turnpike (M.P. 52.5). The project has received final site plan approval.

4.2.3.3 Chesterfield Township

There is one proposed development project located in close proximity to the Project Corridor in Chesterfield Township. Located on the north side of Bordentown-Crosswicks Road on Block 107, Lot 8.01, approximately 500 feet from the northbound side of the Turnpike (M.P. 56.1), the project, the first phase of "Old York Village", has received preliminary site plan approval for 220 single-family dwellings, 1 duplex, 36 triplexes and 16 quadroplexes.

4.2.3.4 Hamilton Township

There are no proposed and/or approved development projects located within or in close proximity to the Project Corridor in Hamilton Township.

4.2.3.5 Washington Township

There are seven proposed and/or approved development projects located in the Project Corridor in Washington Township. The first is a 17 unit single-family residential subdivision to be located on the north side of Potts Road on Block 37, Lots 1, 3, 8 and 9, adjacent to the northbound side of the Turnpike (M.P. 59.8). This project has received final approval. The second is a commercial use to be located on a 10.16-acre parcel approximately 900 feet south of the northbound side of the Turnpike, southwest of Circle Drive and north of Potts Road. This project has received final approval and will consist of Block 37, Lots 6, and 7. The third project is a proposed hotel that has received subdivision and site plan approval on 21.97 acres located north of Route I-195 approximately 400 feet east of the northbound side of the Turnpike, south of Robbinsville Allentown Road (Block 38.01, Lot 15, M.P. 60.75). The fourth project is an approved 7.38-acre soccer field to be located north of Robbinsville Allentown Road and approximately 1,000 feet from the northbound side of the Turnpike (Block 41, Lot 8). The fifth project is an office use of over one million square feet located near the northbound side of the Turnpike south and west of West Manor Way (Block 40, Lots 2, 4 and 5). This project has received final approval. The sixth project is three single-family dwellings on 12.75 acres to be located near the southbound side of the Turnpike, south of Sharon Road (Block 23, Lot 4). The seventh and last project consists of 25 single-family dwellings located on Block 47, Lots 4, 8 and 23.02. This project, which has received final approval, will be on 91.41 acres and is to be located near the southbound side of the Turnpike, southeast of Allens Road.

4.2.3.6 East Windsor Township

There are two approved development projects located in the Project Corridor in East Windsor Township. The first consists of 106 single-family age-restricted dwellings to be located on the north side of Monmouth Road on Block 16, Lots 1, 2, 5 and 6 approximately 200 feet from the southbound side of the Turnpike. This project has received final approval. The second consists of 209 dwellings on 104.22 acres located approximately 1,100 feet from the northbound side of the Turnpike. This development is to be located on the north side of Wycoff Mills Road on Block 13, Lot 1. This project has received final approval.

4.2.3.7 Cranbury Township

There are two approved development projects located in the Project Corridor in Cranbury Township. The first, a proposed office/warehouse use, is located on the northbound side of the Turnpike south of Cranbury Half Acre Road on Block 8, Lot 1.04. The approval status of this project is unknown. The second, Pro Lodges Southpark, is to be located on the current Home Depot site (Block 10, Lots 4 and 19) and will consist of three warehouses: 921,247 square feet, 600,000 square feet and 210,000 square feet. This project has received final approval and is to be located near the southbound side of the Turnpike, south of Station Road and north of Hightstown Cranbury Station Road.

4.2.3.8 Monroe Township

There is one approved development project located within or in close proximity to the Project Corridor in Monroe Township. A 121-room hotel is to be located approximately 600 feet from the southbound side of the Turnpike, south of Forsgate Road and east of Cranbury South River Road (Block 55, Lot 9.07). The parking facility for this development will be located in South Brunswick Township; however, the majority of the development will be located in Monroe.

4.2.3.9 South Brunswick Township

There are six approved development projects located in the Project Corridor in South Brunswick Township. The first is a 562,000 square-foot warehouse to be located west of Cranbury-South River Road on Block 17.01, Lots 6, adjacent to the northbound side of the Turnpike. This project has received final approval. The second project is a Sunoco gas station to be located south of Ridge Road and west of Cranbury South River Road on Block 17.01, Lots 4.05, 5 and 3.01, adjacent to the northbound side of the Turnpike. This project has received final approval. The third project consists of a 5,773 square foot Wawa convenience store to be located on the northbound side of the Turnpike, south of Deans Rhode Hall Road and west of Cranbury South River Road on Block 18.01, Lot 42. This project has received final approval. The fourth project consists of three warehouses (450,000, 600,000 and 750,000 square feet) to be located on the south side of Davidsons Mill Road on Block 21.010, Lot 5.03, adjacent to the northbound side of the Turnpike. This project has received final approval. The fifth project is a proposed office/warehouse use to be located on the southbound side of the Turnpike north of NJ Route 32 between Cranbury South River Road and the Interchange 8A toll plaza on Block 9.01, Lot 3.01. The approval status of this project is unknown. The sixth proposed project consists of a 76-unit residential subdivision to be located on the southbound side of the Turnpike south of Davidsons Mill Road on Block 21.00, Lots 2, 3, 4.01, 5.02 and 34. This project is in the concept review stage.

4.2.3.10 East Brunswick Township

There are no proposed and/or approved development projects located within or in close proximity to the Project Corridor in East Brunswick Township.

4.2.3.11 Milltown Borough

There are no proposed and/or approved development projects located within or in close proximity to the Project Corridor in Milltown.

4.2.4 Proposed Project Impacts

4.2.4.1 Direct Impacts

Direct land use impacts from the Proposed Project will result from property acquisition for additional Turnpike right-of-way, right-of-way acquisition necessitated by the need to relocate local roads that pass over the Turnpike, land acquired for the construction of stormwater detention basins (required to fulfill the requirements of the state's new stormwater management regulations), land acquired for required wetland mitigation and land acquired for utility relocations. In general, direct impacts are considered to have a minor effect on overall land use patterns in the Project Corridor municipalities. A discussion of land use impacts by municipality follows, while a discussion of potential impacts to residences and businesses is contained in Sections 4.3.3 and 4.3.6, respectively. The impacts discussed below are based on preliminary engineering. An effort will be made during final design to minimize these impacts where practical and feasible. A more detailed breakdown of impacts by property, municipality and side of Turnpike is also presented in Appendix C.

Mansfield Township

The Proposed Project will require the acquisition of approximately 41.96 acres of land in Mansfield Township. This represents approximately 0.30 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 21.0 acres of land will be acquired for new right-of-way. Of this total, approximately 14.1 acres will be acquired for the construction of stormwater detention basins, while only 6.9 acres will be acquired for actual construction of the roadway improvements. Of the approximately 21.0 acres on the northbound side, approximately 18.17 acres are in agricultural use, 1.45 acres are undeveloped and 1.33 acres are in residential use (although no residences would be impacted).

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 21.01 acres of land will be acquired for new right-of-way. Of this total, approximately 12.4 acres will be acquired for the construction of stormwater detention basins, while the remaining 8.6 acres will be acquired for actual construction of the roadway improvements. Of the southbound acreage to be acquired, approximately 19.67 acres are in agricultural use, 1.31 acres are undeveloped and 0.03 acres are in residential use (although no residences would be impacted).

Bordentown Township

The Proposed Project will require the acquisition of approximately 16.2 acres of land in Bordentown Township, which represents approximately 0.27 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 9.56 acres of land will be acquired for new right-of-way, with no land being acquired for the construction of stormwater detention basins. Of this total, approximately 6.43 acres are undeveloped, 1.98 acres are in agricultural use, 0.81 acres are residential (although no residences would be acquired) and 0.34 acres are commercial (although no buildings would be acquired).

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 6.7 acres of land will be acquired for new right-of-way. Of this total, approximately 3.5 acres will be acquired for the construction of stormwater detention basins, while the remaining 3.2 acres will be acquired for actual construction of the roadway improvements. Of the total, approximately 4.26 acres are agricultural, 2.42 acres are undeveloped and 0.02 acres are commercial (although no buildings would be acquired).

Chesterfield Township

The Proposed Project will require the acquisition of approximately 28.84 acres of land in Chesterfield Township, which represents approximately 0.21 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 11.55 acres of land will be acquired for new right-of-way. Of this figure, approximately 8.1 acres will be acquired for the construction of stormwater detention basins, while the remaining 3.5 acres will be acquired for actual construction of the roadway improvements. Of the total 11.55 acres, approximately 8.13 acres are agricultural, 1.76 acres are undeveloped and 1.66 acres are residential (with one residence being acquired).

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 17.29 acres of land will be acquired for new right-of-way. Of this figure, approximately 7.7 acres will be acquired for the construction of stormwater detention basins, while the remaining 9.6 acres will be acquired for actual construction of the roadway improvements. Of the 17.29 acres, approximately 14.5 acres are agricultural, 0.98 acre is undeveloped and 0.77 acres are residential (with two residences being acquired). In addition, approximately 1.04 acre would be acquired from a recreational use (day camp). This proposed acquisition is on the camp's periphery and will not affect the use of the facility.

Hamilton Township

The Proposed Project will require the acquisition of approximately 73.06 acres of land in Hamilton Township. This represents approximately 0.28 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 31.4 acres of land will be acquired for new right-of-way. Of this figure, approximately 7.5 acres will be acquired for the construction of stormwater detention basins, while the remaining 23.9 acres will be acquired for actual construction of the roadway improvements. Of the 31.4 acres, approximately 22.51 acres are in agricultural use, 4.44 acres are residential (although no residences would be acquired), 3.22 acres are undeveloped and 1.23 acres are institutional.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 41.66 acres of land will be acquired for new right-of-way. Of this figure, approximately 9.2 acres will be utilized for the construction of stormwater detention basins, while the remaining 32.5 acres will be acquired for actual construction of the roadway improvements. Of the 41.66 acres, approximately 22.11 acres are agricultural, 13.80 acres are undeveloped and 5.75 acres are residential (with three residences being acquired).

Washington Township

The Proposed Project will require the acquisition of approximately 113.43 acres of land in Washington Township, which represents approximately 0.86 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 87.87 acres of land will be acquired for new right-of-way. Of this total, approximately 38.5 acres will be utilized for the construction of stormwater detention basins, while the remaining 49.4 acres will be acquired for actual construction of the roadway improvements. Of the 87.87 acres, approximately 51.91 acres are agricultural, 29.52 acres are undeveloped, 3.99 acres are residential (with one residence being acquired) and 2.45 acres are commercial.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 25.57 acres of land will be acquired for new right-of-way, with no land being acquired for the construction of stormwater detention basins. Of this total, approximately 19.6 acres are undeveloped, 2.64 acres are agricultural, 2.59 acres are residential (although no residences would be acquired) and 0.74 acres are of a public use (the periphery of school property).

East Windsor Township

The Proposed Project will require the acquisition of approximately 105.06 acres of land in East Windsor Township. This represents approximately 1.05 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 69.89 acres of land will be acquired for new right-of-way and the relocation of Interchange 8. Of this figure, approximately 5.7 acres will be acquired for the construction of stormwater detention basins, while the remaining 64.1 acres will be acquired for actual construction of the roadway improvements. Of the 69.89 acres, approximately 46.57 acres are in agricultural use, 15.41 acres are undeveloped, 6.26 acres are in commercial use (with two businesses being acquired) and 1.65 acres are residential (with two residences being acquired).

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 35.15 acres of land will be acquired for new right-of-way. Approximately 3.7 acres of this figure would be required for the construction of stormwater detention basins, while the remaining 31.5 acres will be acquired for actual construction of the roadway improvements. Of the total, approximately 14.46 acres are undeveloped, 13.75 acres are agricultural, 4.47 acres are commercial (with two businesses being acquired). No residential properties

are proposed to be impacted. In addition, approximately 1.48 acres of township-owned land will be acquired, along with four buildings belonging to the Department of Public Works and the East Windsor Municipal Utility Authority's Pump Stations No. 7 and No. 10.

Cranbury Township

The Proposed Project will require the acquisition of approximately 66.36 acres of land in Cranbury Township, which represents approximately 0.77 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 33.96 acres of land will be acquired for new right-of-way. Of this figure, approximately 11.2 acres will be required for the construction of stormwater detention basins, while the remaining 22.8 acres will be acquired for actual construction of the roadway improvements. Of the total, approximately 8.57 acres are undeveloped, 10.37 acres are commercial (although no businesses would be acquired), 1.13 acres are residential (with two residences being acquired) and 13.89 acres are in agricultural use.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 32.39 acres of land will be acquired for new right-of-way. Approximately 14.5 acres of this figure would be required for the construction of stormwater detention basins, while the remaining 17.9 acres will be acquired for actual construction of the roadway improvements. Of the 32.39 acres, approximately 18.22 acres are commercial (although no businesses would be acquired), 10.49 acres are agricultural and 3.68 acres are undeveloped.

Monroe Township

The Proposed Project will require the acquisition of approximately 3.5 acres of land in Monroe Township, which represents approximately 0.01 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 1.53 acres of land will be acquired for new right-of-way. No stormwater detention basins are proposed to be located in Monroe; the new right-of-way will be acquired for actual construction of the roadway improvements. Of the total, approximately 1.08 acres are commercial (although no businesses would be acquired) and 0.45 acres are undeveloped.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 1.98 acres of land will be acquired for new right-of-way. No stormwater detention basins are proposed to be located in Monroe; the new right-of-way will be acquired for actual construction of the roadway improvements. Of the total, approximately 1.8 acres are commercial (although no businesses would be acquired) and 0.17 acres are agricultural.

South Brunswick Township

The Proposed Project will require the acquisition of approximately 6.28 acres of land in South Brunswick Township, which represents approximately 0.02 percent of the township's total area.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, approximately 4.45 acres of land will be acquired for the construction of stormwater detention basins. Of the total, approximately 2.19 acres are agricultural, 1.85 acres are undeveloped and 0.41 acres are commercial (although no businesses would be acquired).

Southbound Side of the Turnpike

On the southbound side of the Turnpike, approximately 1.84 acres of commercial land will be acquired for the construction of a stormwater detention basin. No additional right-of-way will be required for actual construction of the roadway improvements, and no businesses will be acquired.

East Brunswick Township

No right-of-way acquisition is proposed to occur in East Brunswick Township, nor are any stormwater detention basins proposed. Consequently, there will be no impact to land use.

Milltown Borough

No right-of-way acquisition is proposed to occur in Milltown Borough, nor are any stormwater detention basins proposed. Consequently, there will be no impact to land use.

4.2.4.2 Indirect Impacts

The Proposed Project consists of the widening of an existing highway and improvements to interchanges. No new interchanges are proposed and no new access will be provided to areas where there is currently none. As a result, the Proposed Project is not expected to induce noticeable changes in land use patterns, and no indirect impacts are anticipated.

4.2.5 Zoning

4.2.5.1 Mansfield Township

The Proposed Project is not compatible with the residential and open space zoning present on both sides of the Turnpike in Mansfield Township. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.2 Bordentown Township

While compatible with the commercial zoning along U.S. Route 206 on both sides of the Turnpike, the Proposed Project is not compatible with the residential zoning that is present farther north on both sides of the Turnpike in Bordentown Township. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.3 Chesterfield Township

While compatible with the office/warehouse zoning districts located on the south side of Bordentown-Chesterfield Road and the south side of Ward Avenue (both on the northbound side of the Turnpike), the Proposed Project is not compatible with the residential zoning that is present in the remainder of the Project Corridor in Chesterfield Township. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.4 Hamilton Township

The Proposed Project is not compatible with the residential zoning present on both sides of the Turnpike in Hamilton Township. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.5 Washington Township

While compatible with the office/warehouse zoning district located on West Manor Way (northbound side of the Turnpike), the Proposed Project is not compatible with the residential zoning that is present in the remainder of the Project Corridor in Washington Township. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.6 East Windsor Township

While compatible with the commercial and industrial zoning districts located along and south of N.J. Route 33 (northbound side of the Turnpike) and the office/warehouse and industrial districts located north of N.J. Route 133 (both sides of the Turnpike), the Proposed Project is not compatible with the residential zoning that is present in the remainder of the Project Corridor in East Windsor Township. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.7 Cranbury Township

With the exception of a small residentially-zoned district located on Hightstown-Cranbury Station Road (northbound side of the Turnpike), the Proposed Project is compatible with the industrial zoning that comprises the remainder of the Project Corridor in Cranbury Township.

4.2.5.8 Monroe Township

The Proposed Project is compatible with the industrial zoning located south of N.J. Route 32/Forsgate Drive (both sides of the Turnpike) in Monroe Township. It is not, however, compatible with the residential and open space zoning located north of N.J. Route 32/Forsgate Drive (northbound side of the Turnpike). This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.9 South Brunswick Township

The Proposed Project is compatible with the industrial zoning located south of Ridge Road (both sides of the Turnpike) and between Ridge Road and a point approximately 1,000 feet north of Davidsons Mill Road (northbound side of the Turnpike) in South Brunswick Township. It is not, however, compatible with the residential and open space zoning located in the remainder of the Project Corridor. This incompatibility is not new however, as the Turnpike already exists adjacent to these zoning districts and has not affected residential development in the past.

4.2.5.10 East Brunswick Township

No right-of-way acquisition is proposed for East Brunswick Township, nor are any stormwater detention basins proposed. Consequently there will be no impact to zoning.

4.2.5.11 Milltown Borough

No right-of-way acquisition is proposed for the Borough of Milltown, nor are any stormwater detention basins proposed. Consequently there will be no impact to zoning.

4.2.6 Public Policy

4.2.6.1 New Jersey State Development and Redevelopment Plan

The purpose of the New Jersey State Development and Redevelopment Plan (SDRP) is to coordinate planning activities and establish statewide planning objectives in the following areas: land use, housing, economic development, transportation, natural resource conservation, agriculture and farmland retention, recreation, urban and suburban redevelopment, historic preservation, public facilities and services, and intergovernmental coordination (N.J.S.A. 52:18A-200f). The 2001 edition of the SDRP is the current edition; the third round of "cross-acceptance" is currently underway to develop the Plan's next iteration. The Proposed Project is not inconsistent with the statewide transportation policies included in the SDRP.

The SDRP's statewide policies are applied to the natural and built resources of the state through the designation of five Planning Areas and two additional sub-areas. These Planning Areas reflect distinct geographic and economic units within the state and serve as an organizing framework for application of the Statewide Policies of the SDRP. The Project Corridor traverses the following Planning Areas:

- Metropolitan Planning Area (PA 1)
- Suburban Planning Area (PA 2)
- Rural Planning Area (PA 4)
- Rural/Environmentally Sensitive Planning Area (PA 4B)
- Environmentally Sensitive Planning Area (PA 5)

The Project Corridor also passes through or is adjacent to the "Designated Centers" of Hightstown Borough and Milltown Borough, and the North Crosswicks Hamlet in Hamilton.

Each Planning Area has a set of 11 policy objectives that are utilized to guide local and state agency planning. These objectives range from agriculture and natural resource conservation to transportation, public facilities and intergovernmental coordination. Although the SDRP is a comprehensive document, the Proposed Project is most relevant to the transportation policy objective of each planning area. The following discussion evaluates the Proposed Project's consistency with the transportation policy objective of each affected Planning Area.

Metropolitan Planning Area (PA 1)

Transportation Objective: *Maintain and enhance a transportation system that capitalizes on high density settlement patterns by encouraging the use of public transit systems, walking and alternative modes of transportation to reduce automobile dependency, link Centers and Nodes, and create opportunities for transit oriented redevelopment. Facilitate efficient goods movement through strategic investments and intermodal linkages* (SDRP, p. 191).

The Proposed Project is consistent with the objective to facilitate efficient goods movement through strategic investment.

In addition, the Proposed Project is consistent with the Public Facility Objective of the Metropolitan Planning Area, which states: *Complete, repair or replace existing infrastructure systems to eliminate*

deficiencies and provide capacity for sustainable development and redevelopment in the region. Encourage the concentration of public facilities and services in Centers and Cores (SDRP, p. 192).

Suburban Planning Area (PA 2)

Transportation Objective: *Maintain and enhance a transportation system that links Centers and existing large single-use areas to each other, to Metropolitan Planning Areas and to major highway and transit corridors. Emphasize the use of public transportation systems and alternative modes of transportation where appropriate and feasible, and maximize circulation and mobility options (including pedestrian and bicycle connections between developments) throughout….* (SDRP, p. 198).

The Proposed Project is consistent with the objective of maintaining and enhancing a transportation system that links existing areas to each other and to major highway corridors.

Rural Planning Area (PA 4)

Transportation Objective: *Maintain and enhance a rural transportation system that links Centers to each other and to the Metropolitan and Suburban Planning Areas. Provide appropriate access of agricultural products to markets, accommodating the size and weight of modern agricultural equipment. In Centers, emphasize the use of public transportation systems and alternatives to private cars where appropriate and feasible, and maximize circulation and mobility options throughout. Support the preservation of general aviation airports as integral parts of the state's transportation system* (SDRP, p. 209).

Although not a rural transportation system, the Proposed Project will improve the linkage between centers and the Metropolitan and Suburban Planning Areas, as well as maintaining market access for agricultural products.

Rural/Environmentally Sensitive Planning Area (PA 4B)

The Rural/Environmentally Sensitive Planning Area is a subarea of the Rural Planning Area, with no separate set of policy objectives. Any development planned in the Rural/Environmentally Sensitive Area should respect the natural resources and environmentally sensitive features of the area. The Proposed Project will be implemented in such a fashion to minimize any impacts on natural resources and environmentally sensitive features, and any unavoidable impacts will be mitigated.

Environmentally Sensitive Planning Area (PA 5)

Transportation Objective: *Maintain and enhance a transportation system that protects the Environs from scattered and piecemeal development and links Centers to each other within and between Planning Areas. Encourage alternatives to the single-occupancy vehicle (SOV) whenever feasible. Accommodate the seasonal demands of travel and tourism that support recreational and natural resource-based activities. In Centers, emphasize the use of public transportation systems and alternatives to private cars where appropriate and feasible and maximize circulation and mobility options throughout* (SDRP, p. 218).

Although the SDRP discourages SOV use whenever feasible, the provision of high-occupancy lanes (HOVs) to reduce SOV use has been determined to be not practical to meet the Proposed Project's purpose and need (see Section 5.4.1). Because the Proposed Project does not include any new interchanges and will enhance the linkages between Planning Areas by improving the transportation network, it is considered consistent with this objective.

4.2.7 Mitigation of Impacts

Direct impacts to land use in the Project Corridor are considered to be minor. Consequently, no mitigation measures for land use impacts are considered to be necessary. It should be noted, however, that the 11 municipalities in the Project Corridor have the ability to require that buffer areas be provided between the widened Turnpike and any future developments as part of their subdivision and site plan review processes. The proper exercise of this power will reduce future land use incompatibilities in the Project Corridor.

4.2.8 Summary

Property acquisitions resulting from the Proposed Project are anticipated to have a minimal effect on overall land use patterns in the Project Corridor. The total amount of land to be acquired is estimated to be approximately 454 acres. The Proposed Project is generally consistent with the transportation policy objectives of each of the affected Planning Areas.

4.3 Socioeconomics

4.3.1 Introduction

This section presents socioeconomic impacts associated with the Proposed Project. Such impacts include those related to residential displacement, neighborhood disruption, economic effects of construction activity, business displacements, and fiscal impacts associated with acquisition of ratable land.

4.3.2 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no residential or business displacements, nor any fiscal impacts to municipalities comprising the Project Corridor. There would also be no physical disruption to existing neighborhoods bordering the Turnpike. Conversely, there would also be no short-term economic benefit to the state or region during the construction period, since no increase in construction employment would result.

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. These declines in service on both the Turnpike and on alternative north-south routes would contribute to the deterioration of the overall quality of life in central New Jersey.

4.3.3 Residential Displacement

4.3.3.1 Data Sources and Methodology

Residential displacements were assessed to identify the number of housing units and the number of persons that would potentially be displaced by the Proposed Project. The project's preliminary design plans were examined to determine the location of the housing units that might be impacted. Field

surveys were also conducted to confirm these findings. Housing units located in the Project Corridor are predominantly single-family units.

To better understand the characteristics of the persons who would be affected, U.S. Census data were used. Based on the Census data, the number and characteristics of potentially displaced people were estimated based on the reported averages within individual census blocks.

4.3.3.2 Proposed Project Impacts

The preliminary residential displacements along each side of the Turnpike within the Project Corridor are presented below by municipality. It should be noted that these residential impacts are considered to be preliminary since the need for acquisition of these residences will be further evaluated and determined during the Proposed Project's final design process. In addition to the information presented in the text below, Table 4.1 provides further information on the preliminary locations of the displaced units and an estimate of the number of persons displaced.

Table 4.1
Estimate of Persons Displaced Due to the Proposed Widening

Municipality	Turnpike Direction	No. of Residential Units Displaced	Block and Lot	Census Tract/ Block	Average Household Size	Estimate of Persons Displaced
Chesterfield	Northbound	1	204 / 1	7018.01 / 1034	2.6	3
Chesterfield	Southbound	1	100 / 4	7018.01 / 1035	2.3	2
Chesterfield	Southbound	1	101 / 7	7018.01 / 1035	2.3	2
Hamilton	Southbound	1	2725 / 1	30.01 / 3029	3.3	3
Hamilton	Southbound	1	2725 / 2	30.01 / 3029	3.3	3
Hamilton	Southbound	1	2725 / 3	30.01 / 3029	3.3	3
Hamilton	Northbound	1	2732 / 1*	30.01 / 4020	2.5	3
Washington	Northbound	1	37 / 4	43.08 / 9051	2	2
East Windsor	Northbound	1	22 / 59	44.05 / 9035	2.8	3
East Windsor	Northbound	1	22 / 61	44.05 / 9035	2.8	3
		10				**27**

Source: 2000 U.S. Census of Population and Housing.

***Note:** The residence on this property would be impacted by the construction of a stormwater detention basin. A conservative analysis identified this as a displacement; however this is subject to change during final design, when the exact size and location of the detention basin is defined.

Mansfield Township

No residences are anticipated to be acquired for the Proposed Project in Mansfield Township.

Bordentown Township

No residences are anticipated to be acquired for the Proposed Project in Bordentown Township.

Chesterfield Township

Northbound Side of the Turnpike

One residence would likely be acquired on the northbound side of the Turnpike as a result of the relocation of the Bordentown Chesterfield Road overpass and subsequent realignment of Bordentown Chesterfield Road. Based on U.S Census estimates of average household size by Census block, approximately three persons may be displaced by the acquisition of this residence.

Southbound Side of the Turnpike

Two residences would likely be acquired on the southbound side of the Turnpike as a result of the mainline widening. Based on U.S Census estimates of the average household size by Census block, approximately four persons may be displaced by the acquisition of these two residential units.

Hamilton Township

Northbound Side of the Turnpike

One residence could potentially be acquired for the construction of a stormwater detention basin on the northbound side of the Turnpike in Hamilton Township. Based on U.S Census estimates of average household size by Census block, approximately three persons may be displaced by the acquisition of this residential unit. However, it should be noted that during final design, after the precise dimensions and layout of the basin are better defined, this potential displacement could potentially be avoided.

Southbound Side of the Turnpike

Three residences could potentially be acquired on the southbound side of the Turnpike as a result of the mainline widening. Based on U.S Census estimates of average household size by Census block, approximately nine persons may be displaced by the acquisition of these three residential units.

Washington Township

Northbound Side of the Turnpike

One residence would likely be acquired on the northbound side of the Turnpike as a result of ramp construction associated with Interchange 7A. Based on U.S Census estimates of the average household size by Census block, approximately two persons may be displaced by the acquisition of the residential unit.

Southbound Side of the Turnpike

No residences are anticipated to be acquired on the southbound side of the Turnpike in Washington Township.

East Windsor Township

Northbound Side of the Turnpike

Two residences would likely be acquired on the northbound side of the Turnpike as a result of the mainline widening. Based on U.S Census estimates of the average household size by Census block, approximately six persons may be displaced by the acquisition of these two residential units.

Southbound Side of the Turnpike

No residences are anticipated to be acquired on the southbound side of the Turnpike in East Windsor Township.

Cranbury Township

No residences are anticipated to be acquired in Cranbury Township.

Monroe Township

No residences are anticipated to be acquired in Monroe Township.

South Brunswick Township

No residences are anticipated to be acquired in South Brunswick Township.

East Brunswick Township

No residences are anticipated to be acquired in East Brunswick Township.

Milltown Borough

No residences are anticipated to be acquired in Milltown Borough.

4.3.3.3 Mitigation of Impacts

Considering the relocation policies of the Authority and local housing agency programs, as well as the pace of new residential construction in the area and the moderate residential vacancy levels in the three counties comprising the Project Corridor, relocation of displaced residents should not cause a strain on the area's housing market. Estimates from the U.S. Census (2000) indicate that there were 815 vacant units in the three counties, which is 3.9 percent of the total housing stock. According to the 2004 American Community Survey conducted by the U.S. Census Bureau, vacancy rates were approximately 7 percent in Mercer County, 4 percent in Middlesex County and 3 percent in Burlington County.

As presented in Table 4.2, all of the municipalities experiencing residential displacements exhibit fairly modest vacancy rates. Considering the small number of units displaced in each municipality, it does not appear that finding alternate residences would cause undue hardship to the displaced persons.

At present, new housing construction continues at a rapid pace in the region. As of April 2006, building permits for more than 301 new residential units in Burlington County, 217 units in Mercer

Table 4.2
Profile of Housing Availability in Affected Census Block Groups

Municipality	Census Tract/Block Group of Affected Units	Municipal Housing Vacancy Rate
Chesterfield	7018.01 / 1	2.7%
Hamilton	30.01 / 3	2.5%
Washington	43.08 / 9	1.9%
East Windsor	44.05 / 9	3.0%

Source: U.S Census 2000 and NJ MLS Services.
Notes: Home Gain Real Estate MLS Services.

County and 585 units in Middlesex County were issued. Not only are new single- and multi-family units currently appearing at a very fast rate, but the region has developed a housing construction industry that can accommodate a very fast rate of population growth.

In accordance with New Jersey law, specific mitigation measures are proposed to minimize potential adverse relocation impacts. Under the statutes of the State of New Jersey, whenever a government agency undertakes a program of property acquisition for a public project that causes persons or businesses to be displaced, the displacing agency must provide certain relocation benefits to the displaced persons and businesses.

The displacing agency must prepare and submit a *Workable Relocation Assistance Plan* (WRAP) to the Department of Community Affairs for its review and approval prior to initiating displacement.

Upon displacement, the displacing agency, in this case the Authority, must provide a range of assistance to the persons and businesses displaced as specified in the relocation statute and regulations, including assistance in obtaining replacement housing and business locations, and monetary payments to defray the costs of relocation.

4.3.4 Neighborhood Disruption

4.3.4.1 Proposed Project Impacts

Direct impacts expected to result to residences and neighborhoods due to the Proposed Project are minimal. A total of 10 residences could potentially be displaced in the townships of Chesterfield, Hamilton, Washington and East Windsor combined. A total of approximately 27 persons could potentially be displaced.

Due to the limited number of residences expected to be displaced and their geographical separation from each other, no impacts to overall neighborhoods are anticipated. There will also be no fragmentation of neighborhood areas due to the Proposed Project.

4.3.4.2 Mitigation of Impacts

Because no impacts to neighborhood cohesion are expected to occur as a result of the Proposed Project, no mitigation measures are proposed.

4.3.5 Economic Effects of Construction Activity

4.3.5.1 Data Sources and Methodology

An input-output model developed by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA) has been used to quantify the economic effects of the Proposed Project. The model provides the basic methodology for the assessment of potential economic impacts, with modifications to produce multipliers specific to the project's region. Quantification of the effects of material purchases during the construction of the project is based upon the following:

- *Estimates of Material Expenditures*: Projected material expenditures were derived from preliminary engineering estimates.

- *Determination of Specific Goods and Services Required*: The particular goods and services needed for construction of the Proposed Project were evaluated through analysis of "use" vectors for other roadway improvements in the region.

- *Estimates of Local Purchases*: A location quotient analysis was conducted to project the degree to which materials are likely to be purchased in the local region. The location quotients were calculated to reflect the degree to which particular goods are likely to be available within a given region.

- *Application of Multipliers to Evaluate Potential Project Impacts on the Regional Economy*: Output multipliers derived from the BEA input-output model were used to evaluate indirect and induced impacts on the local economy. These output multipliers indicate the total increase in output that occurs in the local economy with each dollar of project expenditures, including re-spending of income derived by local businesses and individuals from direct project-related purchases. Similar employment multipliers were applied to analyze total job creation in the local area resulting from project-related direct expenditures.

Quantification of the effects of payroll-related impacts relied upon the following:

- *Estimates of the Payroll Expenditures:* These are based on typical Davis-Bacon wage rates and NJ Bureau of Labor Statistics estimates for a typical road construction project in the region. Estimates reflect current wage rates as the rates are revised periodically and may be different when construction commences.

- *Adjustments for Fringe Benefits, Taxes and Other Payroll Deductions:* Average fringe benefits for road construction workers in the area of the Proposed Project were determined using Davis-Bacon wage rates for construction trades.

- *Adjustment for Employment of Non-Local Labor:* It was assumed that only construction employees living permanently in the state would contribute to the local economy. Construction workers temporarily relocated into the region were assumed to continue making their major purchases in their home communities. Although they would make contributions to the local community through expenditures for temporary housing, meals and other temporary living expenses, these expenditures are relatively small and short-lived.

- *Application of an Appropriate Multiplier to Determine Total Impacts on the Local Economy:* Multipliers applied to this aspect of the analysis were derived from the BEA model, and then modified to generate regional multipliers relevant to the area of the Proposed Project.

Considering the scale of the project, the entire state has been identified as the primary impact area for materials purchases and payrolls. Payroll impacts in particular are likely to occur within the state, given the Proposed Project's location and the presence of a large resident construction labor force within the state.

4.3.5.2 Employment and Materials Purchase Impacts

The following assumptions were made in determining the economic impacts anticipated to result from the expenditure of the Proposed Project's construction budget:

- A construction budget of approximately $1.6 billion (this represents the $2.1 billion total project cost, minus property acquisition costs).

- A labor-to-materials expenditure ratio of 40/60 (i.e., 40 percent of the total project construction budget was assumed to be expended on labor and 60 percent on materials), based on U.S. Bureau of Economic Analysis statistics on highway construction.[1]

Although the construction labor force will be drawn from all areas of the state, wage rates have been adjusted to reflect the prevailing wage rates in the three study area counties. According to the N.J. Bureau of Labor Statistics, prevailing wage rates for construction workers in the three-county area average approximately $63,500 per year.[2] This figure includes benefits and assumes a 40-hour work week as well as 48 weeks of annual employment.

Based on these data and assumptions, the Proposed Project is estimated to generate approximately 6,748 person-years of construction-related employment over a six-year period, or an annual average of 1,125 jobs (see Table 4.3). Some of these jobs may be provided to laborers that may reside outside the state. The Proposed Project is also estimated to generate total industry sales for construction materials, subcontractors and other goods and services of over $861 million. Payroll expenditures from the Proposed Project are estimated to be over $643 million. After adjusting for non-local sales and leakages for non-local labor, the Proposed Project is estimated to create approximately $1.5 million in direct sales, $384 million in direct earnings, and 6,073 jobs in the state.

The total impact of construction spending was estimated by utilizing input-output tables that have been regionalized to reflect the economic activity patterns of the three-county region, using national inter-industry transactions data from the U.S. Department of Commerce, Bureau of Economic Analysis (BEA) and regional data on industry earnings, employment and journey-to-work patterns. The total impact described above incorporates the multiplier effect, which is composed of the direct, indirect, and induced effect as described below. The multiplier effect or ripple includes the successive rounds of economic activity stimulated by the initial construction spending. Expressed numerically, a multiplier of 1.5 indicates that for every dollar directly generated by the industry under study, an additional $0.50 of ripple effects are felt within the local region, for a total impact of $1.50.

The project's total impact includes three effects:

- **Direct Effect** corresponds to the initial changes in final demand generated by the project.

[1] U.S. Bureau of Economic Analysis, *1997 Benchmark Input-Output Accounts,* Industry Code: 230230: Highway, Street, Bridge, and Tunnel Construction.
[2] Davis-Bacon Wage Determinations, Wage and Hour Division of the U.S. Department of Labor and NJ Bureau of Labor Statistics.

Table 4.3
Construction Employment and Income Generation Associated with the Proposed Project
(2005 U.S Dollars in Thousands)

	Total		
Direct Effect			
Construction Budget (Proposed)	$1,618,347		
- Construction Materials and Services Purchases	$861,359		
- Payroll	$643,040		
- Contingency, Indirect Business Taxes, Profits	$113,949		
Total Construction Jobs	6,748		
Construction Period (months)	72		
Annual Construction Jobs	1,125		
			Jobs
Total Local Multiplier Effect	**Sales**	**Earnings**	**(Person Years)**
Initial Change (Direct)	$1,590,732	$384,494	6,073
Multiplier Effect	$1,971,620	$466,147	15,162
Total Local Impacts	$3,562,352	$850,641	21,236
Annual Local Impacts			
Initial Change (Direct)	$265,000	$64,000	1,012
Multiplier Effect	$329,000	$78,000	2,527
Total Local Annualized Impacts	$594,000	$142,000	3,539

Source: The Louis Berger Group, Inc., 2006

- **Indirect Effect** includes the consecutive rounds of industry spending that were triggered by the initial change in final demand. Local contractors and their employees typically purchase some of their materials and services from other local businesses, which then in turn purchase from their local suppliers, and so on.

- **Induced Effect** refers to the impact triggered by increased household spending by employees of the indirectly affected businesses. Employees spend part of their earnings at local establishments, which in turn purchase some of their input materials and services locally to satisfy this demand, and so on.

4.3.5.3 Mitigation of Impacts

Economic impacts anticipated to result from the Proposed Project are expected to be beneficial. Consequently, no mitigation measures are necessary.

4.3.6 Impacts to Businesses

The business impact analysis focused on commercial facilities whose property, operations, buildings, or improvements may be affected by the Proposed Project. Each encroachment onto existing commercial property is characterized by the type of impact, the type of business, and the approximate number of employees which could be affected. Also discussed below is the potential for temporary impacts to businesses during the construction period.

4.3.6.1 Direct Business Impacts

The preliminary design plans developed for the Proposed Project were overlain onto aerial photographs to determine the location of the commercial establishments that might be impacted. Most of the area along the Turnpike is bordered by undeveloped property or agricultural areas; however, several businesses do abut the existing Turnpike right-of-way.

The type of direct impact that the Proposed Project could have on businesses can be divided into one of two major groups:

- *Impacts arising from the establishment of a new right-of-way for the widened Turnpike mainline or relocated Interchange 8*: The preliminary design plans were utilized to define the proposed new right-of-way line. The type of impact was then further divided into one of three types of direct impacts: 1) on a building (a displacement); 2) on sections of improved property (e.g., a parking lot); or 3) on sections of unimproved property.

- *Impacts arising from the relocation of local road crossings over the Turnpike*: Because local overpasses need to be lengthened to accommodate the required horizontal and vertical clearances for the proposed new Turnpike roadways, new overpasses will need to be constructed, resulting in slight relocations of existing local roads.

It should be noted that the construction of required stormwater detention basins will not result in any direct impacts to businesses. It should also be noted that impacts to utilities are discussed in Section 4.14, *Infrastructure*. The potential direct business impacts are examined by municipality from the south to the north.

Mansfield Township

No business displacements are anticipated to occur in Mansfield Township.

Bordentown Township

No business displacements are anticipated to occur in Bordentown Township.

Chesterfield Township

No business displacements are anticipated to occur in Chesterfield Township.

Hamilton Township

No business displacements are anticipated to occur in Hamilton Township.

Washington Township

No business displacements are anticipated to occur in Washington Township.

East Windsor Township

The Proposed Project is expected to result in the displacement of four business establishments in East Windsor Township, one as a result of the relocation of Interchange 8, two as a result of the widened

southbound mainline and one as a result of the widened northbound mainline. These properties are summarized in Table 4.4 below.

Table 4.4
Potential Business Displacements – East Windsor Township

Approximate Milepost	Turnpike Direction	Business Classification	Location	Estimate of Jobs Lost
67.8	Northbound	Engineering Consultant	Richardson Lane	10
67.9	Northbound	Gas Station	N.J. Route 33	6
67.3	Southbound	Office Building	Ward Street	65
67.4	Southbound	Office Building	Ward Street	44
			Total	**125**

Source: The Louis Berger Group Inc. 2006.

Notes: Job losses were estimated using the following rates -
Retail/Commercial: 1 full time equivalent (FTE) employee per 400 square feet (sf)
Office: 1 FTE employee per 250 sf
Restaurant:1 FTE employee per 200 sf
Manufacturing: 1 FTE employee per 500 sf
Parking: 1 FTE employee per 1,500 sf

Cranbury Township

No business displacements are anticipated to occur in Cranbury Township.

Monroe Township

Although no business displacements are anticipated to occur in Monroe Township, improved property (i.e., parking lots, driveways, etc.) at three businesses would be impacted. Each of the three is located on Abeel Road (near M.P. 73.2, southbound) and would lose approximately six percent of either a driveway or parking lot. These partial acquisitions are not anticipated to impact upon the overall operation of the businesses.

South Brunswick Township

No business displacements are anticipated to occur in South Brunswick Township.

East Brunswick Township

No business displacements are anticipated to occur in East Brunswick Township.

Milltown Borough

No business displacements are anticipated to occur in Milltown Borough.

4.3.6.2 Indirect Business Impacts

It is unlikely that the Proposed Project will result in indirect impacts to businesses not directly affected by right-of-way acquisitions. Indirect business displacements occur when:

- Project actions result in diminished vehicular or pedestrian access or impair the ability of a business to reach customers or markets;
- Direct displacements eliminate key suppliers or reduce concentrations of businesses offering competitive/complementary goods and services that draw customers to a location;
- Direct displacements of residential properties diminish or eliminate the customer base for a business or group of businesses; and
- Project improvements increase the accessibility or attractiveness of an area to an extent that rents and property values increase beyond the means of a particular business or group of businesses

The Proposed Project is designed to provide additional roadway capacity required by current levels of population and employment and future growth anticipated in the region. Current levels of access to commercial centers will be maintained or enhanced and the improvements will result in decreased levels of congestion on connecting roadways and more balanced patterns of traffic on local streets. Direct displacements of business properties will not permanently eliminate key suppliers or diminish concentrations of businesses that draw customers to the area. Due to the limited number of direct residential displacements, the customer base of existing businesses will not be affected.

4.3.6.3 Temporary Construction Impacts on Businesses

Given the nature of the Turnpike as a limited-access highway, the Proposed Project is not expected to restrict or interfere with access to existing businesses. No construction-related road closures or detours are planned which would adversely affect roadway-dependent businesses. Relocated local bridges over the Turnpike will be constructed before the existing overpass is demolished, resulting in only minor impacts to vehicular movement.

4.3.6.4 Mitigation of Impacts

Mitigation of Direct Impacts

For those employees who would lose their jobs as a result of business displacement, their ability and ease in finding comparable employment would depend in part on the type and nature of their job, and on the condition of the local economy at the time of the loss. Mitigation measures would be employed to minimize the impacts of business relocation, business activity loss, and employment loss.

Under the statutes of the State of New Jersey, whenever a government agency undertakes a program of property acquisition for a public project that causes persons or businesses to be displaced, the displacing agency must provide certain relocation benefits to the displaced persons and businesses. The displacing agency must prepare and submit a *Workable Relocation Assistance Plan* (WRAP) to the Department of Community Affairs for its review and approval prior to initiating displacement.

Upon displacement, the displacing agency, in this case the Authority, must provide a range of assistance to the persons and businesses displaced as specified in the relocation statute and regulations, including assistance in obtaining replacement housing and business locations, and monetary payments to defray the costs of relocation.

Mitigation of Short-Term Construction Impacts

Construction-related impacts on area businesses will be minimized to the greatest extent possible. The Authority will notify all area businesses with regard to construction schedules for any potential local road closings, identify any impacts on road-dependent businesses, and undertake construction in a

manner which minimizes impacts. Adequate staging and signage will be established, and coordination will be maintained with local authorities and the media in order to adequately inform businesses and motorists of detours or construction-impacted areas.

4.3.7 Regional Population and Employment: Growth Projections and Potential Induced Growth

Transportation improvements often reduce the time-cost of travel, enhancing the attractiveness of surrounding land to developers and consumers. Changes in the timing or location of development on vacant land, or conversion of farmland or other aspects of the built environment to more intensive uses, can be a consequence of major highway improvements such as freeway widening and interchange improvements. Through changes in household and business development trends, trip making, and travel patterns, highway development can also change the availability and/or condition of natural, cultural, and community resources. These indirect effects can occur at some distance in both time and space from initial transportation improvement, but can have as great an impact on environmental resources as the direct effects along the right-of-way. History has shown, however, that not every transportation improvement has had a substantial influence on the timing or location of land development. Similarly, not every instance of change in land development trends has resulted in adverse impacts to the environment.

4.3.7.1 Known and Anticipated Development Projects

In order to assess potential land use changes in the Project Corridor municipalities, proposed and/or approved residential and commercial developments in the corridor were evaluated. Many of these projects will likely be completed in advance of the Proposed Project. Some projects may have a longer time-horizon and could share a common space or timing with the Proposed Project. These activities provide a background context for understanding the growth trends and pressures under which the Proposed Project is being contemplated.

4.3.7.2 Patterns of Anticipated Growth

A total of nine Traffic Analysis Zones (TAZs) are identified in the Project Corridor. Based on a review of the Baseline (year 2000) and Future (year 2025), population and employment forecasts prepared by the Delaware Valley Regional Planning Commission (DVRPC) and the North Jersey Transportation Planning Authority (NJTPA), the population in these TAZs is expected to increase from 40,269 persons in 2000 to 67,802 in 2025. Additionally, employment in these TAZs is expected to grow from 19,102 in 2000 to 31,424 in 2025. This represents an annual population growth rate of 2.7 percent and a 2.6 percent annual growth in employment.

Induced (indirect or secondary land use) impacts from transportation projects are primarily related to land development activity that is prompted or accelerated by the presence of the transportation improvement. Induced development refers to land use changes which can occur in the vicinity of a highway as a result of improved or new access. If changes in access (e.g., reductions in the time it takes to reach an area, and/or increases in the volume of traffic able to reach it) are sufficient to make it feasible to develop a property which otherwise would not have been developed, an induced impact can be said to have occurred. However, the assessment of induced development impacts depends upon the relative prominence of the highway project in the context of all factors affecting the feasibility of development. Many factors besides access/transportation can affect development feasibility, including population and employment growth (market factors), land availability, parcel configuration and environmental suitability (supply factors), availability of municipal services, zoning and land use plans, and local political considerations.

Most highway projects which are intended to address existing or foreseen traffic congestion problems in rapidly growing metropolitan areas are of the growth-serving type. If a highway project is planned to serve growth that would have occurred without the project, potential induced development impacts would be limited to local development decisions influenced by proximity to the highway. Factors involved in these types of decisions might include proximity to interchanges, or frontage considerations that affect the development prospects of specific parcels. In these cases, development that is already occurring or would occur without the transportation project within an area's overall socioeconomic and geographic context would not be an induced development issue.

Impact of Transportation on Regional Growth and Development

Several recent studies have contained comprehensive reviews of the literature on transportation improvements and regional development.[3] Each of these literature reviews has concluded that in an age where most metropolitan locations are connected by the interstate highway network and other major roadways, new roadway improvements generally do not bring new growth to a region, but instead, influence where growth and development occur on a local level.

Handy's recent review of the literature revealed that studies indicate that:

Beltways and urban highways more generally do not increase the overall rate of growth [in a region] but may influence where growth occurs and at what densities.[4]

Similarly, Boarnet and Haughwout's review for the Brookings Institution found that:

…highway projects affect the geographic location of economic activity by advantaging some places while causing firms and persons to shift their location choices away from other places. (p. 8)

They also note that studies have found that the effects of highways on land prices have been diminishing over time since early studies of the first segments of the interstate system in the 1950s. They note studies have shown that incremental improvements in areas that already possess highway access has changed the scale of the influence of highways on land development activity:

As more highways are built, and the metropolitan highway network matures, the incremental effect on accessibility from new or improved highways decreases, thus accounting for a smaller change in land prices due to any access premium. (p. 6)

New evidence suggests that metropolitan highway projects still influence land use in the way that theory predicts. The important difference between the new evidence and earlier studies is that the geographic scale of the land use effect appears to be somewhat smaller. A new highway or improvement might importantly reduce travel times in the immediate vicinity of a project, even if the resulting changes in metropolitan-wide transportation accessibility are small. Hence the land use effects of modern highway projects likely operate over a very fine geographic scale, rather close to the project. (p. 7)

---

3 Marlon G. Boarnet and Andrew F. Haughwout, *Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development,* The Brookings Institution Center on Urban and Metropolitan Policy, 2000; *NCHRP Report 423A, Land Use Impacts of Transportation: A Guidebook,* Transportation Research Board, 1999; NCHRP Report 456, *Guidebook for Assessing the Social and Economic Effects of Transportation Projects,* Transportation Research Board, 2001; NCHRP Report 403, *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects,* Transportation Research Board, 1998.

4 Susan Handy, "Smart Growth and the Transportation Land Use Connection: What Does the Research Tell Us?" *International Regional Science Review*, Vol 28 pp 146-167, 2005

Household and Business Location Decisions

Throughout the last half of the 20th Century, American cities have moved away from the monocentric form. Cities today are characterized by multiple employment centers with concentrations in traditional central business districts, outlying town centers, and newer suburban areas. The decentralization of metropolitan areas has been the product of the individual decisions of households, businesses, and developers (NCHRP 423A, 1999).

Research has shown that households consider a wide range of factors when choosing where to locate – accessibility to jobs is one factor, but not necessarily the most important.

- Households often rank other factors such as housing cost, distance from heavily urbanized areas, access to amenities, quality of schools, and quality and cost of other public services above access to job opportunities.

- The rise in suburbanization of households has not been accompanied by a large rise in commute times, suggesting that there are limits on how far most people are willing to live from work. Average commutes range from 20 to 30 minutes in most urbanized areas.

- In small urban areas where many locations enjoy good access to jobs, changes in accessibility by auto may not be a significant determinant of household location.

Accessibility is also a factor in the location decisions of business establishments, which value access to markets, suppliers, and labor.

- The Interstate Highway System offers relatively low transportation costs for the movement of goods and passengers over long distances (line-haul benefits). Firms that value this sort of transportation access, such as those producing for regional or national markets, will cluster at interchange locations. Access to transportation is also increasingly important as businesses move to "just-in-time" inventory systems.

- As the steady nature of commute times suggests, suburbanization of households has been accompanied by the decentralization of employment on a regional level. Employers seeking to attract and retain labor have located in suburban areas leading to an increase in the number of suburb-to-suburb commutes over the traditional suburb-to-central-city pattern. Highway access has made outlying locations as accessible or more accessible for businesses than central cities.

- The trend toward decentralization does not weaken the trend for businesses to cluster together, however. The benefits of agglomeration economies still lead business establishments to cluster in activity centers and industrial and commercial parks.

- Surveys of firms indicate that the cost of space is one of the most important factors in the location decision process along with accessibility. The availability of low-cost space in suburban and fringe areas contributes to the suburbanization of business establishments.

- Highway access is important because it is the dominant form of transportation for employees and movement of goods in most areas. Firms and employees also value reliability of travel times, however. In smaller cities where congestion is not a problem, location near high quality routes is not as vital a concern.

Land developers (individuals, businesses, or public agencies) convert land from one use to another either for their own purposes or for sale or lease to others. The location decisions of developers reflect the preferences and requirements of the households or businesses that will utilize the development but are also based upon factors that will affect their own business decisions.

- Accessibility to highways and other forms of transportation and visibility from major travel routes make sites more marketable especially for non-residential uses. These factors are also important to developers seeking to market residential property, but residential developers are often outbid by developers of commercial and industrial properties for the most accessible sites. When considering accessibility, residential developers are looking for access to job opportunities as well as shopping and recreational opportunities.

- Characteristics of the community (e.g., existing land uses, socioeconomic characteristics of residents) and the site under consideration (e.g, slope, views) are also important factors developers consider.

- Favored growth corridors (i.e., outward moving areas of a region experiencing increases in higher income households, suburban development, and upscale retailing) are usually the focus of future development because of the potential for higher return to developers. Higher income areas with good or improving access to the interstate system are often indicators of favored corridors that will support growth in office or retail uses at interchange nodes.

- Governmental regulations and incentives influence both the cost and potential return of a site to a developer. General attitudes toward development and political considerations are important, in addition to site-specific bulk and use regulations. Developers are sometimes willing to take on the risk of applying for a variance or rezoning of a particular site based on expected return and the probability of approval.

Accessibility improvements attributable to highway projects are one of many factors that can influence the location choices of firms and households.

On a regional basis, the impact of a highway project on overall commercial activity is generally minimal. The localized effect of such projects on land use can be substantial, however. If the conditions for development are generally favorable in a region, i.e., the region is undergoing urbanization, then highway and transit projects can become one of the major factors that influence where development will occur, and project-induced growth warrants assessment.

Where transportation projects do influence land development, the general tendency is ultimately toward relatively high-density commercial or multi-family residential development near facility nodes (e.g., highway interchanges) in urban and suburban areas and single-family residential development in the urban fringe.

General circumstances influencing the likelihood of induced development shifts include:

- *Extent and maturity of existing transportation infrastructure* - The influence of highway projects diminishes with successive improvements because each new improvement brings a successively smaller increase in accessibility.

- *Land availability and price* - Development cannot take place without the availability of land of a quality and price suitable for development. Property values are de-facto indicators of the potential for land use change because investment decisions revolve around market prices. Land prices are likely to reflect a parcel's suitability for development (favorable topography),

the availability of other suitable parcels in the area, the attractiveness of the location and many of the other factors listed below. An abundance of suitable, low priced land may be indicative of potential development if other factors are present. A scarcity of land or high price does not necessarily indicate a lower probability of development, however. If other factors described here are favorable, high-density development may occur where land is scarce or high priced.

- *State of the regional economy* - Even if changes in accessibility are great, development is not likely to occur if the regional economy will not support new jobs and households, if credit or financing is not readily available, or if firms conclude that the availability of labor, suppliers, or local markets for goods, are not sufficient.

- *Area vacancy rates* - High local vacancy rates in housing or commercial space of good quality may be absorbed before any shift in development to the project area is seen.

- *Location attractiveness* - The quality of existing development, local politics and growth history are all factors considered in addition to transportation availability and cost.

- *Local political/regulatory conditions* - Low business, property and sales tax rates, the availability of incentives for development such as tax abatements, and a regulatory environment that is favorable to businesses are factors favorable to development. The speed, ease, or predictability of the development review process can also impact development costs and is a factor to be considered.

- *Land use controls* - Development is shaped by zoning ordinances and other land use controls. These controls influence the amount of land available for various uses, the densities permitted, and the costs of development. Pressures for development can prompt communities to alter land use controls, however, and an assessment should be made which considers the likelihood that changes in land use controls will occur. Such an assessment can consider the historical record of zoning enforcement and granting of variances, whether the controls are rooted in long range comprehensive plans, and the existing amount of undeveloped land for each use.

There are three general categories of induced growth effects: (1) projects planned to serve a specific development; (2) projects that would likely stimulate land development having complementary functions; and (3) projects that would likely influence intraregional land development location decisions.[5]

Projects Planned to Serve a Specific Development

This category occurs when the proposed transportation facility would serve a specific development at an existing or proposed activity center (e.g., a highway interchange for a planned residential subdivision). This type of effect is common when land development is used as a selling point for the project and the highway and land development projects are interdependent. The land development proposal is an indirect effect of the highway project. Since the Proposed Project is a widening of an existing highway to relieve congestion, it does not fall into this category.

5 *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects*, Transportation Research Board, National Cooperative Highway Research Program Report No. 403, 1998.

Projects That Would Likely Stimulate Land Development Having Complementary Functions

This category occurs when the proposed transportation facility will likely stimulate supporting and/or complementary land uses such as gas stations, restaurants and hotels at highway interchanges. These developments and their related effects are indirect effects of the highway project. Research has suggested that highway-oriented businesses such as these figure more prominently at rural interchanges than at suburban or urban interchanges, where land values typically support higher density uses.[6]

Projects That Would Likely Influence Intraregional Land Development Location Decisions

This category of induced growth occurs when the proposed transportation facility will likely influence decisions about the location of growth and development among various locations within a region (intraregional development shifts). If conditions in a region are generally favorable for growth, a highway project becomes one of the many factors that influence where development will occur. The general tendency is toward relatively high density commercial or multi-family residential development up to one mile around a freeway interchange and up to between two and five miles along major feeder roadways to the interchange.

4.3.7.3 Known and Anticipated Development Projects

In order to assess potential land use changes in the municipalities of the Project Corridor, proposed and/or approved residential and commercial development projects in the corridor were evaluated (see Table 4.5 and Section 4.2.3). Many of these projects will likely be completed in advance of the Proposed Project. Some projects may have a longer time-horizon and could share a common timing with the implementation of the Proposed Project. These activities provide a background context for understanding the growth trends and pressures under which the Proposed Project is being contemplated.

4.3.7.4 Interchange-Specific Development Potential Analysis

Based on the literature and type of project the Proposed Project is, an analysis was undertaken to assess the development potential of interchanges located in the Project Corridor. Although no new interchanges would be built as part of the Proposed Project, the capacity and accessibility of each would be improved. In addition, Interchange 8 is proposed to be relocated as part of the Proposed Project. A qualitative assessment was made on an interchange-specific basis of attributes that tend to favor development in the immediate vicinity of interchanges based on the review of relevant literature. The focus of the analysis was on commercial and industrial development as this type of development tends to abut interchanges if other attributes are present. Interchange 6 was not included in the analysis because it lacks a direct connection to the local roadway network. Interchange 9 was not included due to the lack of vacant developable land in its vicinity.

For each interchange, a low, medium, or high score was assigned to each attribute based on the relative indication of favorability to development potential. A low score was used if the attribute was not present or sparsely present, while a high score was used if the attribute was clearly present.

The attributes examined, and the corresponding rationale for rank scoring, include the following:

6 Bascom, S.E., Cooper, K.G., Howell, M.P., Makrides, A.C., and Rabe, F.T., *Secondary Impacts of Transportation and Wastewater Investments: Research Results* (July 1975).

Table 4.5
Proposed, Approved, and Planned Developments in the Project Corridor

Municipality	Block	Lot (s)	Description
Mansfield	51.01	4.01	Preliminary Approval – 9 Residential Lots
Bordentown	137.02	11.03	Final Approval – 645,120 s.f. Warehouse
	136	1	Informal Review – Proposed Hotel
Chesterfield	107	8.01	Preliminary Approval – Planned Village Development Area: 220 single-family, 1 duplex, 36 triplexes and 16 quadplexes on 571.8 acres
Hamilton			None
Washington	37	1,3,8 and 9	Preliminary Approval – 17 Single-Family Residences
	37	6 and 7	Final Approval – Commercial use on 10.16 acres
	38.01	15	Final Subdivision and Site Plan Approval – Hotel
	41	8	Final Approval – Soccer Fields
	40	2, 4 and 5	Final Approval – 1,000,000 s.f. Office Use
	23	4	Final Approval – 3 Residences
	47	4 and 23.02	Final Approval – 25 Single-Family Residences
East Windsor	16	1, 2, 5 and 6	Final Approval – 106 Age Restricted Single-Family Residences
	13	1	Final Approval – 209 Residences
Cranbury	8	1.04	Proposed Office/Warehouse Use – Status Unknown
	10	4 and 19	Final Approval – Addition of 3 Warehouses – Building 1: 921,247 s.f., Building 2: 600,000 s.f., Building 3: 210,000 s.f.
Monroe	55	9.07	Final Approval – 121 room hotel.
South Brunswick	9.01	3.01	Proposed Office/Warehouse Use, Status Unknown
	17.01	6	Proposed 562,000 s.f. Warehouse, Status Unknown
	17.01	3.01, 4.05 and 5	Proposed Sunoco Gas Station – Square Footage Unavailable
	18.01	42	Proposed 5,773 s.f. Wawa Convenience Store, Status Unknown
	21.00	2, 3, 4.01, 5.02 and 34	Concept Review – Proposed 76-unit Residential Subdivision
	21.01	5.03	Final Approval – 3 Warehouses – Building 1: 450,000 s.f., Building 2: 600,000 s.f., Building 3: 750,000 s.f.
East Brunswick			None
Milltown			None

Source: The Louis Berger Group, Inc., October 2006.

- *Level of existing development* – Existing commercial/industrial development near the interchange indicates that factors favorable to development are already present and would likely be complemented by the increased capacity and accessibility at the interchange. A low score indicates no development or a lone existing commercial/industrial development, a medium score indicates several individual commercial/industrial developments, and a high score indicates a cluster of commercial/industrial developments.

- *Accessibility to properties fronting intersecting roadways* – The ability to access a property fronting an intersecting road directly from that road indicates development potential for many commercial uses. A low score was used for intersecting roads that are limited-access facilities, e.g., interstate highways, and access to properties in the vicinity is extremely indirect. A medium score was applied to intersecting roads that are limited-access facilities but where access to the properties in the vicinity of the interchange is moderately indirect. A high score was used for intersecting roads having little or no access limitations to fronting properties.

- *Location of the interchange with respect to existing commercial activity centers* – Over time, development tends to occur along distinct paths from a concentrated core (activity node). Similar establishments often appear in clusters so as to create an identifiable destination for consumers. Meanwhile, establishments that supply or service these clusters tend to locate nearby. A low score for this attribute was given if the interchange is not located nearby (greater than ten-minute drive time) or within the apparent path of recent development. A medium score was given if the interchange is located nearby (less than ten-minute drive time) and within the apparent path of urbanization. A high score was given if the interchange is either within a recently developed commercial activity center or between and within a ten-minute drive time of two recently developing activity centers.

- *Available/planned water and sewer service* – Public water and sewer are needed to support higher densities of commercial development, as well as industrial development. A low score was given if the interchange is not within an area served or planned to be served by water and sewer. A medium score was given if the interchange is within an area served by water or sewer but not both. A high score was given if the interchange is in an area served by both water and sewer.

- *Zoning* – Zoning is the tool used by local municipalities to guide the location of development, the type of development, and the scale of development. Zoning ordinances are based on a comprehensive planning process which is often periodically updated. A low score was assigned to those interchanges that are in areas not zoned for commercial or industrial development and not planned for growth based on the local master plans. A medium score was given to areas with a moderate amount of commercially or industrially zoned property in the vicinity of an interchange. A high score was assigned to those interchanges with a high density of commercially and/or industrially zoned land nearby.

- *Available land* – Even if all the other attributes are in place, development will be limited if developable land (generally vacant land of suitable topography and size) is not available in the vicinity of the interchange. A low score was assigned if there is a lack of developable land in the vicinity of the interchange. A medium score was assigned if there is a moderate amount of developable land in the vicinity of the interchange. A high score was assigned if there is a large amount of available land in the vicinity of the interchange.

A composite score of overall development potential was tallied for each interchange based on the individual attribute scores. A low score was assigned if the individual attribute scores were predominantly low. A medium score was assigned if the individual attribute scores were predominantly moderate or if there was a general mix of scores. A high score was assigned if the individual attribute scores were predominantly high.

The induced development potential of the area approximately one mile around each interchange is discussed below and summarized in Table 4.6.

Table 4.6
Development Potential Matrix

Interchange	Level of Existing Development	Accessibility to Abutting Properties	Proximity to Activity Center(s)	Available/Planned Water & Sewer	Appropriate Zoning	Available Land	Overall Development Potential	Comments
7	◘	●	●	●	◘	◘	◘	Land with Turnpike visibility is zoned for commercial use.
7A	○	○	◘	●	○	○	○	Development potential low due to the lack of available land and inappropriate zoning in the vicinity, as well as the interchange being with a limited-access roadway (I-195).
8	◘	●	●	●	●	◘	●	Developable parcels along Route 33 and intersecting roads.
8A	●	●	●	●	●	○	○	Development potential low due to the lack of available land in the vicinity.
○	Low							
◘	Medium							
●	High							

Interchange 7

The area within one mile of Interchange 7 is moderately developed. Although there are numerous tracts of undeveloped land, many are zoned for agriculture or residential use. Several tracts of land located on U.S. Route 206 or Old York Road, however, are zoned for research and office uses, have good access to the Turnpike, are served by water and sewer and are situated close to existing commercial activity centers. The potential of the overall area around this interchange to become more attractive for development with the Proposed Project is medium.

Interchange 7A

The area within one mile of Interchange 7A is mainly undeveloped. However, with the exception of the area north of Route I-195 and east of the Turnpike (along West Manor Way), this land is zoned for agriculture or residential use. In the area north of Route I-195 and east of the Turnpike, although the land is commercially zoned, the majority of it is already committed to development. In addition, there is no direct access to the area near West Manor Way from the Turnpike; a driver would be required to travel from Interchange 7A on Route I-195 to Robbinsville-Allentown Road. As a result of these factors, the potential of the overall area around this interchange to become more attractive for development with the Proposed Project is low.

Interchange 8

Within one mile of the proposed relocated Interchange 8, the area on the northbound side of the Turnpike is largely undeveloped, while the area on the southbound side is primarily developed. The undeveloped land on the northbound side has appropriate zoning, has good access to the Turnpike, is served by water and sewer and is situated close to existing commercial activity centers. The potential of

the overall area around this interchange to become more attractive for development with the Proposed Project is high.

Interchange 8A

The area within one mile of Interchange 8A is mainly developed, with little remaining developable land. Consequently, the potential of the overall area around this interchange to become more attractive for development with the Proposed Project is low.

Overall Project Corridor Growth Potential

It should be noted that although the induced development potential near several interchanges is medium or high, the Proposed Project overall is growth-serving rather than growth-inducing. The three counties in the Project Corridor have witnessed increased growth over time, and are expected to continue to do so whether or not the Proposed Project is constructed. Market forces associated with the growth of the area and the strategic position of these counties along the existing highway have been and will continue to be the principal drivers of this growth. Regional demographic analyses have indicated that the rapid development of the region and the Project Corridor will likely continue whether or not the Proposed Project is constructed.

The proposed residential and commercial improvements in the vicinity of the Turnpike are consistent with the local land use plans and associated zoning regulations. A discussion of the local land use regulations in the area is provided in Section 3.3, *Land Use and Zoning*. The principal influence of the Proposed Project on land development, if any, will be on the timing of specific developments (i.e., an acceleration). Because of the intense market pressures that exist absent the Proposed Project, the eventual decision of whether or not to develop a parcel would likely not be materially affected by the Proposed Project. In addition, Turnpike access is already present at the project corridor interchanges (and has been since the Turnpike opened in 1951). Development patterns near the interchanges are a function of the already-present access combined with regional and national development patterns. The effects of any localized changes in land development attributable to the Proposed Project would be subject to local control through zoning and other land development ordinances.

4.3.8 Summary

A total of eleven residences would potentially be acquired by the Proposed Project, causing the displacement of approximately 30 persons. The Authority's relocation policies would aid in the relocation of all displaced residents.

A total of seven businesses will be directly impacted as a result of the Proposed Project. Four of the business impacts involve total acquisition of the property, including buildings, while the remaining three involve the partial acquisition of improved property in the form of parking lots and a driveway. These business impacts may result in the relocation of an estimated 120 employees.

In contrast to the business displacement that would potentially occur as a result of the Proposed Project, an estimated annual average of 1,125 construction jobs over a six-year period are anticipated to be generated from the Proposed Project's construction budget. In addition, the Proposed Project is expected to create approximately $1.6 billion in direct sales, $384 million in direct earnings, and 6,073 jobs in the state.

Although land would be acquired in each of the municipalities in the Project Corridor (with the exception of East Brunswick and Milltown), these acquisitions represent a minimal percentage of each municipality's land area.

4.4 Environmental Justice

4.4.1 Introduction

The determination of whether the populations of concern are subject to disproportionately high and adverse environmental impacts involves two principal considerations: 1) evidence of previous disproportionate environmental degradation caused by past major projects or pre-existing sources of environmental contamination; and, 2) a disproportionate distribution of impacts caused by the proposed project. The first consideration deals with projects or impacts which have occurred in the past and may still be affecting these persons. One of the purposes of Federal Executive Order 12898 and New Jersey Executive Order 96 is to assure that areas of low-income and high minority concentrations have not previously been "dumping grounds" for land uses that cause significant adverse environmental impacts. The second consideration involves a determination of whether plans for the proposed project have been directed toward low-income and high minority areas because of factors such as lower property values or expectations that there might be less effective citizen opposition in these areas.

4.4.2 Data Sources and Methodology

Making a determination of whether low-income and high minority areas have been disproportionately impacted involves comparing the magnitude of impacts within and outside these areas. The impacts are inventoried and quantified to the extent possible within and outside these areas. Then mitigation measures are recommended to address these impacts.

The following types of impacts were evaluated in this analysis:

• *Previous Environmental Degradation* – Previous degradation to the physical or social environment in a minority or low income community can arise from past projects which had major impacts, or an accumulation of land uses that have a negative impact on the environment. Additional impacts related to the proposed project, however small, can have a greater cumulative effect in areas where previous levels of degradation are high.

• *Impacts Related to the Proposed Project* – Impacts identified in this and other technical studies have been evaluated to determine whether their effect is borne disproportionately by communities of concern. Issues considered include:

- Residential displacement due to right-of-way acquisition
- Changes in accessibility and mobility afforded by the proposed project
- Noise

4.4.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no impact anticipated to residential areas within the Project Corridor, regardless of whether they are low income or high minority areas.

4.4.4 Proposed Project Impacts

4.4.4.1 Previous Environmental Degradation

Previous environmental degradation in a community of concern can arise from past projects which had major impacts or an accumulation of land uses which cause adverse impacts.

Past Projects

Local planners were consulted to determine if there have been any major projects carried out within or near the low-income and high minority areas which might have caused significant adverse environmental impacts. Emphasis was placed on identifying projects which required environmental reviews under E.O. 215 or the National Environmental Policy Act (42 U.S.C. 4321 et seq.), or major local construction projects. Such projects could include, for example, solid waste disposal facilities, incinerators, trash disposal or transfer facilities, or major transportation projects.

Major private projects were not considered unless they involved significant environmental effects, in which case they probably would have an environmental review. Although there has been substantial private development activity within and near these areas, no private projects were identified which met the significant impact criterion. Major private projects have been constructed throughout the Project Corridor and have not been disproportionately located in or near areas inhabited by low-income and high minority persons.

Other Sources of Environmental Degradation

The U.S. EPA maintains a detailed database of point sources of environmental contaminants[7]. This database is a good indicator of the degree of pre-existing environmental degradation throughout the country. EPA-regulated sites data is provided by zip code area and street address. The analysis of this data began with a study of the density of EPA-regulated sites within zip code areas which overlap the Project Corridor. The analysis found that, other than establishments that handle hazardous wastes, no other environmentally-sensitive establishments such as active or archived superfund sites were identified within the Project Corridor.

4.4.4.2 Residential Displacements

The county percentages of minority residents and persons living below the poverty level were used as the basis for determining those areas with high minority and low-income concentrations. Block groups that had either minority percentages above the county average or poverty levels above the county average were designated as areas with potentially high concentrations of minority or low-income persons. These areas constitute communities of concern for the purpose of evaluating potential Environmental Justice effects.

As presented in Table 4.7, residential displacements along the Project Corridor are minimal in number and would occur in only five of the eleven municipalities in the Project Corridor. The five municipalities experiencing residential displacements include Chesterfield Township, Hamilton Township, Washington Township, East Windsor Township and Cranbury Township, as discussed below. Table 4.7 also presents a detailed demographic profile of the census blocks in the five municipalities exhibiting residential displacements related to the Proposed Project.

Chesterfield Township

Three residential units are expected to be displaced in Chesterfield Township due to the Proposed Project. Based on 2000 U.S. Census data, the percentage of minority persons within the affected census blocks and the number of persons above poverty within the larger affected block group are lower than the county thresholds for these two indicators. Persons below poverty accounted for a

[7] http://www.epa.gov/enviro/html/cerclis/cerclis_query.html

Table 4.7
Demographic Profile of Areas with Occupied Residential Units to be Potentially Displaced

Municipality	Turnpike Direction	No. of Residential Units Displaced	Census Tract, Block	Average Household Size	Estimate of Persons Displaced	Percent Minority	Percent Below Poverty	Median Household Income	Per-Capita Income	High Minority	High Poverty
Chesterfield Township	Northbound	1	7018.01, 1034	2.6	3	7.2%	1.6%	$84,622	$32,001	N	N
Chesterfield Township	Southbound	1	7018.01,1035	2.3	2	0.0%	1.6%	$84,622	$32,001	N	N
Chesterfield Township	Southbound	1	7018.01,1035	2.3	2	0.0%	1.6%	$84,622	$32,001	N	N
Hamilton Township	Southbound	1	30.01,3029	3.3	3	0.0%	1.0%	$70,156	$27,939	N	N
Hamilton Township	Southbound	1	30.01,3029	3.3	3	0.0%	1.0%	$70,156	$27,939	N	N
Hamilton Township	Southbound	1	30.01,3029	3.3	3	0.0%	1.0%	$70,156	$27,939	N	N
Washington Township	Northbound	1	43.08,9051	2	2	0.0%	2.7%	$90,293	$39,158	N	N
East Windsor Township	Northbound	1	44.05,9035	2.8	3	17.6%	8.2%	$55,391	$28,036	N	N
East Windsor Township	Northbound	1	44.05,9035	2.8	3	17.6%	8.2%	$55,391	$28,036	N	N
Cranbury Township	Northbound	1	87, 1006	3	3	23.1%	0.0%	$72,778	$31,653	N	N
Cranbury Township	Northbound	1	87, 1006	3	3	23.1%	0.0%	$72,778	$31,653	N	N
		11			**30**						

Source: 2000 U.S. Census Bureau
Notes: Median Household Income and Per-Capita Income based on Census Block Group Estimates.

lower proportion of the population within the particular block group compared to the county (1.6 percent versus 4.7 percent). Median household income and per-capita incomes in the area affected by the residential displacement are higher than those prevalent in the county. As a result, the affected area in Chesterfield Township does not exhibit characteristics of communities of concern for environmental justice impacts and will not experience such impacts.

Hamilton Township

Three residential units are expected to be displaced within the limits of Hamilton Township due to the Proposed Project. Based on 2000 U.S. Census data, no minority persons were identified in the census block affected by the residential displacements. Within the larger affected block group, the number of persons below poverty accounted for a lower proportion of its population compared to the county as a whole (1.0 percent versus 7.1 percent). Median household income and per-capita incomes in the block group affected by the displacements are also higher than those prevalent in the county. As a result, the affected area in Hamilton Township does not exhibit characteristics of communities of concern for environmental justice impacts and will not experience such impacts.

Washington Township

One residential unit is expected to be displaced in Washington Township due to the Proposed Project. Based on 2000 U.S. Census data, no minority persons were identified in the census block affected by the residential displacements. Within the larger affected block group, the number of persons below poverty accounted for a lower proportion of its population compared to the county as a whole (2.7 percent versus 7.1 percent). Median household income and per-capita incomes in the area affected by the residential displacements are higher than those prevalent in the county. As a result, the affected area in Washington Township does not exhibit characteristics of communities of concern for environmental justice impacts and will not experience such impacts.

East Windsor Township

Two residential units are expected to be displaced in East Windsor Township due to the Proposed Project Based on 2000 U.S. Census data, minority persons accounted for 17.6 percent of the population within the affected census block. This percentage was lower than the county threshold for minority persons (35.8 percent). Similarly, the number of persons below poverty accounted for a lower proportion of the larger affected block group population compared to the county as a whole (8.2 percent versus 8.6 percent). Median household income and per-capita incomes in the area affected by

the residential displacements are higher than those prevalent in the county as a whole. As a result, the affected area in East Windsor Township does not exhibit characteristics of communities of concern for environmental justice impacts and will not experience such impacts.

Cranbury Township

Two residential units are expected to be displaced in Cranbury Township due to the Proposed Project. Based on 2000 U.S. Census data, minority persons accounted for 23.1 percent of the population within the affected census block. This percentage was lower than the county threshold for minority persons (38.1 percent). No low-income persons were reported within the census block group affected by the displacements. Median household income and per-capita incomes in the larger block group affected by the residential displacements are higher than those prevalent in the county as a whole. The affected area in Cranbury Township does not exhibit characteristics of communities of concern for environmental justice impacts and will not experience such impacts.

4.4.4.3 Changes in Accessibility and Mobility Afforded by the Proposed Project

By providing additional capacity on the existing roadway and improving access, the Proposed Project will maintain and improve existing levels of access and mobility in and near the Project Corridor. The proposed improvements are not expected to disproportionately impact low-income and/or minority communities located along the Project Corridor.

No reductions or changes in transit services are anticipated as result of the Proposed Project. The Proposed Project is not anticipated to alter pedestrian, auto, and transit access to community facilities or commercial shopping areas or travel patterns within and between neighborhoods.

4.4.4.4 Noise

Existing noise levels were monitored at 18 locations along the Project Corridor (see Section 3.19). Existing noise levels at seven sites were found to be above the abatement criteria of 66 dBA established by the Authority. However, the residential populations in the vicinity of these seven sites do not exhibit high concentrations of minority persons or low-income persons. Accordingly, low-income and minority areas will not be disproportionately impacted by noise.

4.4.5 Mitigation of Impacts

In the preliminary design phase of the Proposed Project, every effort has been made to keep the number of property acquisitions required to a minimum. The widening of the existing roadway and the access improvements proposed are designed to maintain current levels of accessibility and mobility within local neighborhoods in addition to accommodating anticipated future demand. Table 3.22 presents the census blocks in the study area exhibiting higher proportions of the minority residents than their county thresholds. None of the residential units to be displaced are located in these high minority census blocks. None of the displaced households live in block groups exhibiting levels of poverty higher than the county thresholds (See Table 3.23). Therefore, residential displacement impacts resulting from the Proposed Project do not appear to be appreciably more severe and greater in magnitude upon minority and low-income populations.

Existing noise levels at seven sites were found to be above the abatement criteria of 66 dBA established by the Authority. However, the residential populations in the vicinity of these seven sites do not exhibit high concentrations of minority persons or low-income persons. Accordingly, low-income and minority areas will not be disproportionately impacted by noise. Additionally, low-income and minority

persons are not expected to be disproportionately impacted air pollutants along the Project Corridor. Therefore, no mitigation of impacts to environmental justice populations is warranted.

4.5 Farmlands

4.5.1 Introduction

For the analysis of farmland impacts, direct impacts are considered. Direct impacts are classified as those that result in the actual acquisition of existing farmland or changes in access to individual farms due to the need for additional Turnpike right-of-way to accommodate the widening or relocation of local roads that pass over the Turnpike, and/or land needed for the construction of stormwater detention basins.

4.5.2 Data Sources and Methodology

The farmland properties proposed to be acquired were identified by using the preliminary design drawings prepared for the Proposed Project overlain on aerial photographs and land use information, along with current property tax information.

The information developed in Section 3.6 (*Description of the Affected Environment – Farmlands*) regarding preserved farms located in the Project Corridor was also utilized. The farmland preservation status was gathered from county and municipal planning department documents and parcel databases. In addition, farmland statistics such as the county farmland inventories and value of agricultural products were obtained from the 2002 U.S. Census of Agriculture (U.S. Department of Agriculture, National Agricultural Statistics Service) and from the New Jersey Department of Agriculture.

4.5.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no direct or indirect impact to farmlands or ADA lands within the Project Corridor.

4.5.4 Proposed Project Impacts Summary

Farmland impacts by county and municipality are presented below, and a summary of direct impacts is presented in Table 4.8. These impacts are based on preliminary engineering. An effort will be made during final design to minimize these impacts where practical and feasible.

4.5.5 County Summaries

4.5.5.1 Burlington County

In Burlington County, approximately 67 acres of farmland are proposed to be acquired by the Proposed Project. This acreage represents approximately 0.06 percent of the total farmland in the county. Based on the per-acre value of agricultural production in the county, $748 per acre, the farmland proposed to be acquired as a result of the Proposed Project represents a loss of approximately $50,116 (0.06 percent) of annual production. This impact is not considered to be significant. In addition, approximately 59.8 acres of ADA land are proposed to be acquired by the Proposed Project. These takings represent approximately 0.08 percent of the total ADA land in the county. This impact is not considered to be significant.

Table 4.8
Project Corridor Farmland Acquisition Summary

Municipality	Number of Farms	Size (acres)	Approx. Area to be Acquired (Acres)
Burlington County	**29**	**1,747**	**67**
Mansfield Twp.	18	1012	38
Bordentown Twp.	3	41	6
Chesterfield Twp.	8	694	23
Mercer County	**35**	**1,466**	**168**
Hamilton Twp.	9	439	48
Washington Twp.	13	399	58
East Windsor Twp.	13	628	62
Middlesex County	**7**	**486**	**24**
Cranbury Twp.	4	220	20
Monroe Twp.	1	7	0.20
South Brunswick Twp.	2	259	4
Total Within Project Corridor	**71**	**3,699**	**259**

Source: The Louis Berger Group, Inc.; Burlington County Department of Information Technology; Mercer County Planning Department; and Middlesex County Planning Department.

4.5.5.2 Mercer County

In Mercer County, approximately 168 acres of farmland are proposed to be acquired. This acreage represents approximately 0.67 percent of total farmland in the county. Based on the per-acre value of production from farmland in the county, $487 per acre, the farmland proposed to be acquired as a result of the Proposed Project represents a loss of approximately $81,816 (0.67 percent) of annual production. This impact is not considered to be significant. In addition, approximately 157.6 acres of ADA land are proposed to be acquired by the Proposed Project. These takings represent approximately 0.31 percent of the total ADA land in the county. This impact is not considered to be significant.

4.5.5.3 Middlesex County

In Middlesex County, approximately 24 acres of farmland are proposed to be acquired. This acreage represents approximately 0.11 percent of total farmland in the county. Based on the per-acre value of agricultural production in the county, $976 per acre, the farmland proposed to be acquired as a result of the Proposed Project represents a loss of approximately $23,424 (0.11 percent) of annual production. This impact is not considered to be significant. In addition, approximately 10.6 acres of ADA land are proposed to be acquired by the Proposed Project. These takings represent approximately 0.06 percent of the total ADA land in the county. This impact is not considered to be significant.

4.5.6 Municipal Summaries

4.5.6.1 Mansfield Township

The Proposed Project will potentially necessitate the acquisition of approximately 37.9 acres of farmland in Mansfield Township. This acreage is comprised of 18 parcels of land and represents approximately 0.03 percent of total county farmland. Approximately 4.79 acres are proposed for

preservation and approximately 13.5 acres are preserved farmland. A summary of farmland acquisitions is presented in Table 4.9. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 29.24 acres of ADA land on 19 parcels, representing approximately 0.04 percent of the total ADA land in the county.

Table 4.9
Farmland Acquisitions Located in the Project Corridor:
Mansfield Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
4	31.6	4.79	Proposed
5	95.9	2.5	Yes
6	16.8	2.0	
7	86.1	1.31	
8	19.2	0.61	
9	28.7	1.91	Yes
11	15.2	0.33	
13	138.3	4.73	
14	17.1	0.55	
15	59.4	3.10	
16	111.1	4.17	
17	110.4	0.36	Yes
19	45.5	3.32	
20	26.2	2.05	
21	46.4	0.58	
22	69.7	1.83	Yes
23	22.1	0.13	
25	72.0	3.58	Yes
TOTAL:	**1,011.7**	**37.9**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed farmland takings occur on seven properties, totaling approximately 13.45 acres. Of this figure, approximately 6.7 acres are required for the construction of stormwater detention basins. Of the seven properties, two are preserved farms (on three separate parcels) and two are proposed for preservation. The first of these three is the Lisehora property located at M.P. 49.5. This farm is proposed for preservation and the proposed acquisition is considered to be minor, as it occurs on the farm's periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage. The second is the Kanter property located at M.P. 50.0. This is a preserved farm comprised of two parcels. The proposed acquisition here is also considered to be minor, as it occurs on the edge of the farm and is comprised of trees and shrubs rather than tillable acreage. The third is the Durr property, a preserved farm located at M.P. 51.0. The approximately 1.9 acres proposed to be acquired on this parcel are required for a stormwater detention basin. This is also considered a minor acquisition since only a small portion of the 28.7 acre farm is proposed for acquisition. On the northbound side of the Turnpike, potential impacts to ADA land occur on 11 properties and total approximately 14.64 acres.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, proposed farmland takings occur on 11 properties, totaling approximately 24.4 acres. Of this figure, approximately 6.5 acres are required for the construction of stormwater detention basins. Of the 10 properties, three are preserved farms. The first preserved farm is the Hoefling property located at M.P. 50.0. The proposed acquisition of 0.36 acres is considered to be minor since it is a very small portion of the 110.4 acre property. The second preserved farm which has property proposed to be taken is a second Durr property located just north of M.P. 51.0. This acquisition is also considered to be minor since it occurs on the farm's periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage. The third preserved farm is the Winzinger property located at M.P. 52.0. The proposed acquisition of 3.6 acres is considered to be minor, since it also occurs on the periphery of the 72 acre farm, in a buffer area. On the southbound side of the Turnpike, potential ADA impacts occur on eight parcels, totaling approximately 14.6 acres.

4.5.6.2 Bordentown Township

The Proposed Project will result in the acquisition of approximately 6.24 acres of farmland in Bordentown Township. The proposed acquisitions occur on three parcels of land and represent approximately 0.01 percent of the county's total farmland. The farmland to be acquired does not include any preserved farms or farms proposed for preservation in the township. A summary of farmland acquisitions is presented in Table 4.10. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 5.93 acres of ADA land on three parcels, representing approximately 0.01 percent of the total ADA land in the county.

Table 4.10
Farmland Acquisitions Located in the Project Corridor:
Bordentown Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
28	11.2	1.98	
30	11.8	1.43	
31	18.0	2.83	
TOTAL:	**41.0**	**6.24**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed farmland acquisition occurs on one property, totaling approximately 1.98 acres. This is considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and are small portions of each individual farm. On the northbound side of the Turnpike, potential impacts to ADA land occur on two parcels and total approximately 3.1 acres.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, proposed farmland acquisition occurs on two properties, totaling approximately 4.26 acres. Of this figure, approximately 3.5 acres are required for the

construction of stormwater detention basins. These are considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and are small portions of each individual farm. On the southbound side of the Turnpike, potential ADA land impacts occur on one parcel and total approximately 2.83 acres.

4.5.6.3 Chesterfield Township

The Proposed Project will result in the acquisition of approximately 22.5 acres of farmland in Chesterfield Township. These acquisitions occur on eight parcels of land and represent 0.02 percent of the county's farmland. The farmlands to be acquired do not include any preserved farmlands or farmlands proposed for preservation in the township. However, a portion of a preserved woodland would be acquired, as detailed below. A summary of farmland acquisitions is presented in Table 4.11. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 24.58 acres of ADA land on 13 parcels, representing approximately 0.03 percent of the total ADA land in the county.

Table 4.11
Farmland Acquisitions Located in the Project Corridor:
Chesterfield Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
32	16.12	4.88	
33	12.5	1.43	
34	19.4	1.81	Yes
35	23.1	0.88	
36	42.6	3.31	
37	15.1	1.11	
38	4.9	1.22	
39	562*	7.97	
TOTAL:	**693.9**	**22.5**	

* Note: This is the total acreage of the Albert Wagner Youth Correctional Facility, not all of which is farmland.
Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed farmland acquisition occurs on three properties, totaling approximately 8.12 acres. These are considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and are small portions of each individual farm. In addition, approximately 1.81 acres (9.4 percent) of a preserved woodland located near M.P. 56.3 would be acquired. This is considered to be minor, since it occurs on the lot's periphery, where much of the land serves as a buffer comprised of low quality trees and shrubs. On the northbound side of the Turnpike, potential impacts occur on five ADA parcels and total approximately 8.06 acres.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, proposed farmland acquisition occurs on five properties, totaling approximately 14.5 acres. These are considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and are small portions of the farmland. On the southbound side of the Turnpike, potential impacts occur on eight parcels, and total approximately 16.52 acres.

4.5.6.4 Hamilton Township

The Proposed Project will result in the acquisition of approximately 48 acres of farmland in Hamilton Township. These acquisitions occur on nine parcels of land and represent approximately 0.19 percent of total farmland in the county. Three of these parcels, representing approximately 15.6 acres, are preserved farmland. A summary of farmland acquisitions is presented in Table 4.12. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 60.99 acres of ADA land on 25 parcels in Hamilton, representing approximately 0.12 percent of the total ADA land in the county.

Table 4.12
Farmland Acquisitions Located in the Project Corridor:
Hamilton Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
40	29.7	2.39	Yes
42	119.3	8.85	Yes
44	33.2	8.05	
45	28.3	3.22	
46	92.4	4.37	Yes
47	6.7	3.28	
48	8.6	5.55	
50	74.2	8.14	
51	46.2	4.05	
TOTAL:	**439.0**	**48.0**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed farmland acquisition occurs on four properties, totaling approximately 22.51 acres. Of this figure, approximately 4.7 acres are required for the construction of stormwater detention basins. There are two preserved farms located on the northbound side in Hamilton which have property proposed for acquisition. These two farms are comprised of three separate parcels. The Doerler property is located near M.P. 57.2. This 2.39 acre acquisition is considered to be minor, since it occurs on the farm's periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and is a small portion (8.0 percent) of the farm's total area. The Kim/Kwon property is comprised of two parcels located near M.P. 58.0. Approximately 7.1 acres from the farm's parcel located south of Yardville Allentown Road and approximately 1.75 acres from the parcel located north of Yardville Allentown Road are proposed to be acquired. This is also considered to be minor since it occurs on the periphery of each parcel, where

much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and comprises a small portion of each parcel's overall total area (approximately 8.6 percent and 4.8 percent). On the northbound side of the Turnpike, potential ADA impacts occur on 10 properties and total approximately 19.32 acres.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, proposed farmland acquisition occurs on five properties, totaling approximately 25.39 acres. Of this figure, approximately 7.5 acres are required for the construction of stormwater detention basins. One farm which has property proposed for acquisition is preserved. This farm, comprised of two parcels, is another section of the Doerler property located on the northbound side (see above). Approximately 1.46 acres from the farm's parcel located south of Broad Street and approximately 2.91 acres from the parcel located north of Broad Street are proposed to be acquired. These takings are considered to be minor since much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and it comprises a small portion of the total property (approximately 8.35 and 3.88 percent respectively). On the southbound side of the Turnpike, potential impacts to ADA land occur on 15 properties and total approximately 41.67 acres.

4.5.6.5 Washington Township

The Proposed Project will result in the acquisition of approximately 57.9 acres of farmland in Washington Township. These acquisitions occur on 13 parcels of land and represent approximately 0.23 percent of the total farmland in the county. The farmlands to be acquired do not include any preserved farmlands or farmlands proposed for preservation. A summary of farmland acquisitions is presented in Table 4.13. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 86.02 acres of ADA land on 33 parcels in the township, representing approximately 0.17 percent of the total ADA land in the county.

Table 4.13
Farmland Acquisitions Located in the Project Corridor:
Washington Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
52	28.6	3.45	
53	48.0	2.65	
54	19.6	3.34	
55	20.5	0.59	
56	52.9	1.49	
57	22.5	16.34	
58	10.5	5.70	
59	53.4	6.12	
60	24.0	2.74	
62	39.8	3.22	
63	35.1	0.44	
64	13.5	9.68	
65	30.8	2.18	
TOTAL:	**399.2**	**57.9**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed acquisitions occur on 12 properties, totaling approximately 55.76 acres. Of this figure, approximately 15.3 acres are required for the construction of stormwater detention basins. These are considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer, and comprise small portions of each individual farm. On the northbound side of the Turnpike, potential impacts occur on 62.57 acres of ADA land on 22 properties.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, proposed acquisition occurs on one properterty, totaling approximately 2.18 acres. This is considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer, and are small portions of the farmland. On the southbound side of the Turnpike, potential impacts occur on 11 ADA properties and total approximately 23.45 acres.

4.5.6.6 East Windsor Township

The Proposed Project will result in the acquisition of approximately 62.41 acres of farmland in East Windsor Township. These acquisitions occur on 13 parcels of land and represent approximately 0.25 percent of total farmland in the county. Approximately 3.34 acres of the farmland to be acquired are preserved farmland. A summary of farmland acquisitions is presented in Table 4.14. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 10.56 acres of ADA land on 16 parcels in East Windsor, representing approximately 0.02 percent of the total ADA land in the county.

Table 4.14
Farmland Acquisitions Located in the Project Corridor:
East Windsor Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
68	62.2	3.34	Yes
69	88.5	2.13	
70	63.5	0.01	
71	27.8	0.29	
72	42.9	2.79	
73	73.6	23.30	
74	28.3	13.73	
75	56.5	0.09	
76	43.4	0.66	
77	24.9	1.36	
78	30.3	3.25	
80	68.3	1.74	
81	18.2	9.72	
TOTAL:	**628.4**	**62.41**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed farmland acquisition occurs on eight parcels, totaling approximately 45.68 acres. Of this figure, approximately 5.7 acres are required for the construction of stormwater detention basins. Of the eight parcels, one is preserved farmland. This parcel is part of the Cedarland 1 preserved farm, which is located near M.P. 65.0. Although this proposed 3.35 acre acquisition consists of portions of eight parcels, it is considered to be minor since it occurs on the farm's periphery, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage, and is a small portion of the total overall farm (approximately 5.4 percent). On the northbound side of the Turnpike, potential impacts occur on 14 parcels of ADA land and total approximately 8.98 acres.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, proposed farmland acquisition occurs on five properties, totaling approximately 13.75 acres. The farmlands to be acquired do not include any preserved farmlands or farmlands proposed for preservation. On the southbound side of the Turnpike, potential impacts occur on two parcels of ADA land and total approximately 10.56 acres.

4.5.6.7 Cranbury Township

The Proposed Project will result in the acquisition of approximately 19.82 acres of farmland in Cranbury Township. These acquisitions occur on four parcels of land and represent approximately 0.09 percent of total farmland in the county. None of these parcels are a preserved farm or proposed for preservation. A summary of farmland acquisitions is presented in Table 4.15. In addition, the Proposed Project will potentially necessitate the acquisition of approximately 10. 6 acres of ADA land on 2 parcels in the township, representing approximately 0.06 percent of the total ADA land in the county.

Table 4.15
Farmland Acquisitions Located in the Project Corridor:
Cranbury Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
82	35.3	4.67	
84	101.8	8.43	
85	14.1	0.79	
86	68.5	5.93	
TOTAL:	**219.7**	**19.82**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed takings acquisition occurs on three properties, totaling approximately 13.89 acres. These are considered to be minor since they occur on the periphery of each farm, where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage and are a small portion of the farms (13.25 percent, 8.27 percent and 5.62 percent). On

the northbound side of the Turnpike, a potential impact occurs on one ADA parcel and totals approximately 4.67 acres.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, one proposed acquisitions occur totaling 5.93 acres. Of this figure, approximately 3.7 acres are required for the construction of stormwater detention basins. These are considered to be minor, since they occur on the farms' periphery where much of the land serves as a buffer and is a small portion of the farms (8.65 percent and 4.55 percent). On the southbound side of the Turnpike, a potential impact occurs on one ADA property and totals approximately 5.93 acres.

4.5.6.8 Monroe Township

The Proposed Project will result in the acquisition of approximately 0.17 acres of farmland in Monroe Township. This acquisition occurs on one parcel and represents approximately 0.0007 percent of total farmland in the county. This parcel is neither a preserved farm nor proposed for preservation. A summary of farmland acquisitions is presented in Table 4.16. No ADA lands are anticipated to be impacted by the Proposed Project.

Table 4.16
Farmland Acquisitions Located in the Project Corridor:
Monroe Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
90	6.8	0.17	
TOTAL:	**6.8**	**0.17**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

There is no proposed farmland acquisition on the northbound side of the Turnpike.

Southbound Side of the Turnpike

On the southbound side of the Turnpike, a proposed acquisition occurs on one property, totaling approximately 0.17 acres. The acquisition is considered to be minor since it occurs on the farm's periphery where much of the land serves as a buffer comprised of trees and shrubs rather than tillable acreage and is a small portion of the farm (approximately 2.46 percent).

4.5.6.9 South Brunswick Township

Property will be acquired for the construction of stormwater detention basins in South Brunswick. This construction will result in the acquisition of approximately 3.64 acres of farmland in the township. These acquisitions occur on two parcels of land and represent approximately 0.01 percent of the total farmland in the county. The farmlands to be acquired do not include any preserved farmlands or farmlands proposed for preservation in the township. A summary of farmland acquisitions is presented in Table 4.17. No ADA lands are anticipated to be impacted by the Proposed Project.

Table 4.17
Farmland Acquisitions Located in the Project Corridor:
South Brunswick Township

Map Number	Size (Acres)	Approx. Area to be Acquired (Acres)	Preserved
92	52.3	2.06	
93	206.5	1.58	
TOTAL:	**258.8**	**3.64**	

Source: The Louis Berger Group, Inc.

Northbound Side of the Turnpike

On the northbound side of the Turnpike, proposed acquisition occurs on two properties, totaling approximately 3.64 acres. These are considered to be minor, since they occur on the farms' periphery, where much of the land serves as a buffer, and are small portions of the farmland (approximately one percent).

Southbound Side of the Turnpike

There is no proposed farmland acquisition on the southbound side of the Turnpike.

4.5.6.10 East Brunswick Township

There are no proposed farmland or ADA acquisitions in East Brunswick Township.

4.5.6.11 Milltown Borough

There are no proposed farmland or ADA acquisitions in Milltown.

4.5.7 Mitigation of Impacts

Since acquisition of farmland represents such a small percentage of total county and respective municipal farmland totals, little mitigation is required. On most of the affected farms, almost all of the takings are to occur at the edge of the farms. Most of this land serves as more of a buffer area of trees and shrubs which separate the working portion of the farm from the Turnpike, rather than being actively-tilled land.

Besides the properties that are proposed to be acquired, the Proposed Project is not expected to result in any changes in access to existing farmlands. Relative to the overall municipal and county farmland totals, the acreage to be acquired represents a minimal percentage and, therefore, is not considered a significant impact. Consequently no further mitigation measures are required or proposed.

4.6 Community Facilities

4.6.1 Introduction

Community facilities identified in the baseline section of this report include: schools; police, fire and emergency medical service providers; hospitals and health care facilities; and other facilities, such as

places of worship, libraries, institutional residences, childcare facilities, and cemeteries. Parks and recreational areas, which could also be considered community facilities, are discussed separately in Section 4.7.

Impacts to a community facility may occur if all or a portion of the facility's property is acquired, or if there is a change in the operation of the facility during the construction or operation of the Proposed Project. The types of changes that have been addressed include:

- Actual displacement of the facility building.
- Disruption to the physical boundaries (property area) of the facility.
- Changes in access to the facility.
- Changes to the service area of the facility.
- Creation of a noise or visual intrusion that affects facility service or operation.
- Effect of increased noise levels or degraded air quality.
- Effect on facility user groups, particularly in those areas where residential displacement occurs.

Each facility was evaluated with respect to the potential impacts listed above. If the impact required expansion of emergency services such as police, fire or ambulance, etc., these were noted accordingly, as were any prospective changes in response times for emergency vehicles.

For the purpose of this analysis, direct impacts are classified as those that result in the actual displacement of the existing facility building, disruption to the physical boundaries of the facility and changes in the access to the facility. Indirect impacts include changes in the service area of the facility and the creation of a noise or visual intrusion that affects the future service or operations. As residential displacements can alter the composition of the user groups for a particular facility, these effects are classified as indirect impacts.

One of the indirect impacts of the Proposed Project includes impacts to the local roads that pass over the existing Turnpike. Based on the preliminary design plans, the existing bridge spans of these roadways are not long enough to accommodate the proposed widening. Consequently, these bridges will be rebuilt (parallel to their existing locations) after which the old bridges will be demolished. These local roads will remain open at all times and access to community facilities, as well as travel routes for emergency vehicles, will be maintained.

4.6.2 Data Sources and Methodology

Direct and indirect impacts to existing community facilities were determined by reviewing the preliminary design drawings developed for the Proposed Project. These preliminary design plans depict existing property lines and buildings, as well as proposed right-of-way lines and proposed slope limits.

Discussions were held with the Proposed Project's engineering team to obtain information on any road closures and detours that might affect access to the identified facilities. The location and extent of residential displacements were reviewed to assess changes in the service area of the existing community facilities. Other technical studies performed such as noise and air quality were reviewed to make a determination of any adverse indirect impacts in the vicinity of the existing facilities.

4.6.3 No-Build Alternative

Since no property acquisitions will occur, nor any changes to the access routes for community facilities or their service areas would occur with the No-Build Alternative, there would be no direct or indirect impacts to community facilities.

4.6.4 Proposed Project Impacts

4.6.4.1 Mansfield Township

The Liberty Lake Day Camp is a privately operated day camp located adjacent to the southbound side of the Turnpike on the north side of Columbus-Florence Road (M.P. 49.5). The Proposed Project will require the acquisition of approximately 3.1 acres of buffer area on the property for the relocation of the Columbus-Florence Road overpass and the construction of a stormwater detention basin. This acquisition is not expected to have an adverse impact upon the camp's present and future operation. In addition, no changes in access to the facility are anticipated, nor are changes to the facility's service area. No other community facilities are located in the Project Corridor in Mansfield Township.

Based on the preliminary design plans, the existing Columbus-Hedding Road (C.R 678) overpass will be replaced. Due to the proposed construction of the bridge and subsequent traffic detours, a slight increase in emergency response times this section of the Project Corridor is expected. Based on preliminary traffic management plans, the total length of the traffic detour along this section during the construction of the bridge would be 3.2 miles, compared to the current 2.4-miles without the detour. The proposed detour would result in an increased travel distance of 0.8 miles, with a resulting increase of 1.6 minutes to emergency response times at an average emergency vehicle speed of 30 m.p.h.

4.6.4.2 Bordentown Township

There are no community facilities located in the Project Corridor in Bordentown Township; therefore, none will be impacted by the Proposed Project. The Holy Lutheran Church, which is located beyond the Project Corridor, will also not be impacted.

4.6.4.3 Chesterfield Township

There are no community facilities located in the Project Corridor in Chesterfield Township; therefore, none will be impacted by the Proposed Project.

4.6.4.4 Hamilton Township

St. John's Episcopal Church, located on the north side of Yardville-Allentown Road, adjacent to the Turnpike on the northbound side (M.P. 58.1) is the only community facility located in the Project Corridor in Hamilton Township. The Proposed Project will require the acquisition of approximately 1.24 acres of undeveloped land on the property's western edge for the proposed right-of-way. This acquisition is not expected to adversely impact this facility or affect its future operations. In addition, no changes in access to the church are anticipated, nor are changes to the facility's service area.

4.6.4.5 Washington Township

Sharon School, located on the south side of Sharon Road adjacent to the Turnpike on the southbound side (M.P. 62.5), is one of two community facilities identified in the Project Corridor in Washington Township. The Proposed Project will result in the acquisition of approximately 0.74 acres of wooded buffer area on the property. However, the area to be acquired adjoins the existing roadway and the acquisition is not expected to result in any direct impact to the building or present functioning of the school. Additionally, no indirect impacts due to possible increase in noise levels or changes in access are expected to affect the operations of the school. The second community facility, Princeton Memorial Park Cemetery, is located adjacent to Sharon School to the south. The cemetery would not experience any loss of land as a result of the Proposed Project. Current and future operations of the cemetery are

not expected to be adversely affected. No changes in access to the cemetery are anticipated, nor are changes to the facility's service area.

4.6.4.6 East Windsor Township

The golf course affiliated with the private Peddie School abuts the southbound Turnpike near M.P. 66.5. The Proposed Project will require the acquisition of approximately 1.14 acres of land presently used by the golf course. However, the land to be acquired is located on the periphery of the golf course and is not presently in active use. In addition, no changes in access to the golf course are anticipated. Therefore, current or future operations of the golf course are not expected to be adversely affected by the Proposed Project.

The Meadow Lakes Health Center, located adjacent to the golf course to the north (M.P. 67.0) is the other community facility located in this portion of the Project Corridor. The Proposed Project will result in the acquisition of approximately 4.47 acres of land along the eastern periphery of the facility for the proposed new right-of-way. However, no buildings or associated residential facilities would be impacted. Land to be acquired is dominated by shrubs and is not utilized in any form. In addition, no changes in access to the facility are anticipated, and any potential increases in noise would be mitigated by a noise barrier.

4.6.4.7 Cranbury Township

There are no community facilities located in the Project Corridor in Cranbury Township; therefore, none will be impacted by the Proposed Project.

4.6.4.8 Monroe Township

An assisted-living facility known as Castle Senior Living at Forsgate is located on the south side of N.J. Route 32 (Forsgate Drive) adjacent to the northbound side of the Turnpike (M.P. 73.2). The Proposed Project will have no direct impact to this facility as there will be no right-of-way acquisition at this location and the existing noise barrier would remain.

4.6.4.9 South Brunswick Township

There are no community facilities located in the Project Corridor in South Brunswick Township; therefore, none will be impacted by the Proposed Project.

4.6.4.10 East Brunswick Township

No right-of-way acquisition is proposed to occur in East Brunswick Township, nor are any stormwater detention basins proposed. Therefore, there will be no direct impact to community facilities located in the Project Corridor.

4.6.4.11 Milltown Borough

No right-of-way acquisition is proposed to occur in Milltown, nor are any stormwater detention basins proposed. Therefore, there will be no direct impact to community facilities located in the Project Corridor.

4.6.5 Mitigation of Impacts

Right-of-way acquisition for new roadway improvements and/or for required stormwater detention basins is not expected to result in the temporary or permanent displacement of any community facilities identified in the Project Corridor as a result of the Proposed Project. The extent of land to be acquired from the facilities discussed above is not expected to alter the present or future functioning of the facilities. With the exception of a noise barrier proposed to be located near the Meadow Lakes Health Center in East Windsor (See Section 4.19.5.3), no mitigation is required.

4.6.6 Summary

As discussed above, none of the community facilities identified in the Project Corridor are expected to be directly impacted by the Proposed Project. The Proposed Project is also not expected to result in any changes in access or service area to the existing facilities. The extent of land to be acquired from the facilities identified above is minimal compared to their respective site areas and is predominantly located on the periphery of the impacted lots. Potential impacts to community facilities are summarized in Table 4.18.

Table 4.18
Community Facility Impact Summary

Municipality	Community Facility	Type of Impact	Severity of Impact
Mansfield	Liberty Lake Day Camp	Acquisition of approx. 3.1 ac.	Minor
Hamilton	St. John's Episcopal Church	Acquisition of approx. 1.2 ac.	Minor
Washington	Sharon School	Acquisition of approx. 0.7 ac.	Minor
East Windsor	Peddie School Golf Course	Acquisition of approx. 1.1 ac.	Minor
East Windsor	Meadow Lakes Health Center	Acquisition of approx. 4.5 ac.	Minor

4.7 Parks, Open Space, and Recreational Facilities

4.7.1 Introduction

This section assesses the potential impacts of the No-Build Alternative and the Proposed Project on parks, open space and recreational facilities located along the Project Corridor. Specifically, the analysis addresses the Proposed Project's potential to affect these facilities during both construction and operation, whether by using the areas directly or by causing increased noise and other disturbances that may affect their attractiveness or utility. The analysis identifies the location of impacts and quantifies any direct acquisition or constructive use. The applicable legal and regulatory requirements and guidance adhered to for conducting this analysis are discussed in Section 3.7. For descriptions of the facilities analyzed in this section, including the location, size, function, uses, and population served, also refer to Section 3.7.

4.7.2 Data Sources and Methodology

By comparing the Proposed Project's preliminary design plans to mapping of parks, open space and recreational facilities, an assessment was made as to how these facilities would be directly or indirectly affected by the project, largely in terms of potential changes to use/access, noise, air quality and aesthetics. The significance of the Proposed Project was assessed as to whether there are direct displacements or alterations of existing resources. Direct impacts include acquiring the park, open space or recreational facility for right-of-way or stormwater detention basins required by the state's stormwater management regulations. Consideration was given as to whether the Proposed Project would generate additional levels of employment and population that may create additional demand for parks, open space and recreational facilities and, if so, whether this demand can be satisfactorily met with available resources.

All reasonable and practicable mitigation measures to reduce or eliminate significant impacts to parks, open space and recreational areas have been identified and discussed. In situations where significant adverse impacts occur from the Proposed Project, mitigation measures are identified.

4.7.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no direct or indirect impact to existing parks, open space and recreational facilities located in the Project Corridor.

4.7.4 Proposed Project Impacts

An assessment to determine direct and indirect impacts was conducted on all parks, open space and recreational facilities located in the Project Corridor. Direct impacts are expected to be minimal given the small amount of parkland affected in comparison to the overall size of the respective impacted properties. It should be noted that in all cases, acquisition will occur on the periphery of each facility, with minimal to no effect on the use or accessibility of each parcel.

4.7.4.1 Mansfield Township

No parks, open space or recreational facilities are located in the Project Corridor in Mansfield Township; therefore, the Proposed Project will have no impact.

4.7.4.2 Bordentown Township

As shown in Table 4.19, three parcels of open space would be directly impacted by the Proposed Project in Bordentown Township. In Federal Estates, approximately 3.1 acres of open space will be directly impacted (approximately 16.5 percent of the two affected parcels). In Holloway Meadows, approximately 1.43 acres will be directly impacted on one parcel (12.1 percent). The open space parcels in Federal Estates and Holloway Meadows are both currently for the private use of the residents of these developments.

In addition to the three parcels mentioned above, a fourth parcel, owned by the Authority, has been identified for potential future preservation as open space by Burlington County. The 7.4-acre parcel is located adjacent to Interchange 7 and is proposed to be the location of an approximately 1.2 acre-stormwater detention basin (16.2 percent of the parcel's total) required to comply with NJDEP stormwater regulations.

Table 4.19
Parks and Open Spaces Impacted Directly – Bordentown Township

Name	Block	Lot	Total Acreage	Acreage to Be Acquired	Percentage of Total Acreage
Federal Estates	93	10	17.2	2.4	14.0%
Federal Estates	93	11	1.6	0.7	43.8%
TOTAL			**18.8**	**3.1**	**16.5%**
Holloway Meadows	92.01	1	11.8	1.43	12.1%
TOTAL			**11.8**	**1.43**	**12.1%**

Source: The Louis Berger Group, Inc. 2006.

4.7.4.3 Chesterfield Township

No parks, open space or recreational facilities are located in the Project Corridor in Chesterfield Township; therefore, the Proposed Project will have no impact.

4.7.4.4 Hamilton Township

One tract of open space would be directly impacted by the Proposed Project in Hamilton Township. Approximately 0.6 acres of the 22-acre Nami tract would be acquired, representing approximately 2.7 percent of the undeveloped tract's total size. The acquisition would occur along the tract's western periphery and would not adversely affect its use.

4.7.4.5 Washington Township

A park (Washington Township Community Park) and two areas of open space (the Thompson Tract and Assunpink State Wildlife Management Area) will be directly impacted by the Proposed Project (Table 4.20). Approximately 2.18 acres would be acquired from Washington Township Community Park. This figure represents 7.1 percent of the park's total area; however, the land to be acquired lies on the park's periphery and consists primarily of a buffer area of brush and shrubs. Approximately 5.36 acres would be acquired from the Assunpink Wildlife Management Area (WMA), which represents approximately 0.09 percent of the WMA's total area of 6,304 acres. Both the Assunpink WMA and Washington Township Community Park were acquired and/or constructed with funding received under the state's Green Acres program. The acquisition of the acreage in the Washington Township Community Park and the Assunpink WMA must comply with the Green Acres regulations applicable to the disposal or diversion of parkland.

4.7.4.6 East Windsor Township

There are three parks and one open space tract that will be impacted by the Proposed Project in East Windsor Township (Table 4.21). These parcels – Lenox County Park, Turnpike Municipal Park, East Windsor Regional Park and the Conover Tract (municipal open space) are discussed below.

In Lenox County Park, a total of approximately 1.59 acres will be acquired. This represents approximately 2.7 percent of the park's total area. In Turnpike Municipal Park, approximately 0.4 acres (4.2 percent) will be impacted. This park was acquired using funds from New Jersey's Green

Table 4.20
Parks and Open Spaces Impacted Directly - Washington Township

Name	Block	Lot	Total Acreage	Acreage to Be Acquired	Percentage of Total Acreage
Washington Township Community Park	24	1	30.8	2.18	7.1%
TOTAL			**30.8**	**2.18**	**7.1%**
Thompson Tract	44	33	39.8	3.22	8.1%
Thompson Tract	44	34	35.1	0.44	1.3%
TOTAL			**74.9**	**3.66**	**4.9%**
Assunpink State WMA	21	15	19.8	1.12	5.7%
Assunpink State WMA	19	15	177.2	4.24	2.4%
TOTAL			**202.6**	**5.4**	**2.7%**

Source: The Louis Berger Group, Inc. 2006.

Table 4.21
Parks and Open Spaces Impacted Directly – East Windsor Township

Name	Block	Lot	Total Acreage	Acreage to Be Acquired	Percentage of Total Acreage
Lenox County Park	44	6	43.4	0.66	1.5%
Lenox County Park	45	18	14.6	0.93	6.4%
TOTAL			**58.0**	**1.59**	**2.7%**
Turnpike Municipal Park	45	17	10.3	0.43	4.2%
TOTAL			**10.3**	**0.43**	**4.2%**
Conover Tract	29	3	80.0	1.11	1.4%
Conover Tract	29	4	37.5	0.26	0.7%
Conover Tract	29	6	68.3	1.74	2.5%
Conover Tract	29	16	30.3	1.64	5.4%
TOTAL			**216.1**	**4.75**	**2.2%**
East Windsor Regional Park	30	16	63.5	0.01	0.0%
East Windsor Regional Park	30	18	88.5	2.13	2.4%
TOTAL			**152.0**	**2.14**	**1.4%**

Source: The Louis Berger Group, Inc. 2006.

Acres program. As noted above, coordination with the state's Green Acres program will be required. A total of 2.1 acres will be from East Windsor Regional Park, representing approximately 1.4 percent of the park's total area. Approximately 4.8 acres will be acquired from the Conover Tract, representing 2.2 percent of the tract's total area. It should be noted that in all cases, right-of-way acquisition will occur on the periphery of each facility, primarily consisting of undeveloped areas of brush not utilized for active recreation. It is not anticipated that any of these acquisitions would affect the functionality of these parks.

4.7.4.7 Cranbury Township

No parks, open space or recreational facilities are located in the Project Corridor in Cranbury Township; therefore, the Proposed Project will have no impact.

4.7.4.8 Monroe Township

No parks, open space or recreational facilities are located in the Project Corridor in Monroe Township; therefore, the Proposed Project will have no impact.

4.7.4.9 South Brunswick Township

No parks, open space or recreational facilities located in the Project Corridor in South Brunswick Township will be impacted by the Proposed Project.

4.7.4.10 East Brunswick Township

No parks, open space or recreational facilities located in the Project Corridor in East Brunswick Township will be impacted by the Proposed Project.

4.7.4.11 Milltown Borough

No parks, open space or recreational facilities are located in the Project Corridor in Milltown Borough; therefore, the Proposed Project will have no impact.

4.7.5 Direct Impacts on Proposed or Planned Parks and Open Spaces

Based on a review of the master plans of the eleven communities located in the Project Corridor and interviews with municipal staff, it has been determined that no planned or proposed parks, open spaces or recreational facilities will be directly impacted by the Proposed Project. No facilities of this type are proposed or planned for the Project Corridor except for one facility in Hamilton Township, where a greenway or hiking trail is proposed to follow Crosswicks Creek, which runs perpendicular to the Turnpike. The Proposed Project will not directly impact this proposed pathway. The pathway is planned to run underneath the Turnpike overpass spanning Crosswicks Creek.

4.7.6 Mitigation of Impacts

The parcels that will be directly impacted lie along the periphery of each facility and only a small percentage of each facility's overall total area would be impacted. These sections are dominated by shrubs and heavy vegetation and are not utilized by park users. Because any impact to these facilities is anticipated to be minor, no mitigation measures are necessary.

As noted above, parks and open space directly impacted by the Proposed Project which were acquired with funding from the state's Green Acres program (Assunpink WMA, Washington Township Community Park and Turnpike Municipal Park) will require replacement parkland and coordination with NJDEP and the New Jersey State House Commission.

4.8 Cultural Resources

4.8.1 Introduction

This section presents a discussion of the impacts to cultural resources located within the Project Corridor that could potentially result from the Proposed Project. The cultural resource investigations included background research, reconnaissance surveys, archaeological subsurface testing and historic architectural assessments as outlined in Section 3.9.2. The complete Cultural Resource Survey Report is contained in a separate volume.

4.8.2 Data Sources and Methodology

Based on the results of the reconnaissance survey and archaeological sensitivity assessment for the Proposed Project, as well as the systematic testing conducted in areas identified as having high probability of containing prehistoric archaeological resources and select locations of low probability, the potential for impacts was identified. Details of the methodology used for conducting the shovel tests are presented in Section 3.9.2.

In the case of historic architectural resources, direct and indirect impacts of the Proposed Project on properties listed on or eligible for the National Register and/or the State Register were identified and assessed by reviewing the preliminary design plans of the Proposed Project in relation to such properties. Assessment of visual impacts to such properties was conducted in conjunction with the visual assessment undertaken and presented in Section 4.9.

4.8.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no direct or indirect impact to archaeological resources or historic architectural resources listed or eligible for listing on the National Register and/or State Register.

4.8.4 Proposed Project Impacts on Archaeological Resources

Based on the results of the reconnaissance survey and archaeological sensitivity assessment, all areas of high probability and select locations of low probability were systematically tested for the presence of prehistoric archaeological resources. No prehistoric archaeological resources were identified within the archaeological APE, and none are likely to exist within the remaining untested areas of the APE considered to have low to no probability of containing such resources. Given these findings, it is concluded that the archaeological APE does not contain any identifiable prehistoric archaeological resources that will be impacted by the Proposed Project.

During the nineteenth century, the Project Corridor was predominantly rural, characterized by dispersed mixed subsistence/commercial farms supported by a network of roads, railroads, and towns. Farmsteads were located away from the historic main transportation corridors and village centers while other historic buildings such as taverns, inns, and school houses were clustered near crossroads or main corridors of travel such as Old York Road. Background research and reconnaissance surveys of the archaeological APE did not identify any features or ruins of taverns, school houses, or farmsteads within or immediately adjacent to the APE. However, one late 19th to mid-20th century historic dump was identified during the subsurface archaeological testing conducted at the location of a proposed southbound on-ramp at Interchange 7A. This resource will be impacted by the Proposed Project; however, this resource does not appear to be eligible for the National Register or the State Register.

Given these findings, it is concluded that the archaeological APE does not contain any identifiable Register-eligible historic archaeological resources that will be impacted by the Proposed Project.

All proposed construction staging areas, locations associated with wetland mitigation, and other work areas associated with the Final Design plans for the Proposed Project have not been investigated for the presence of archaeological resources. As such, these areas will likely require an archaeological assessment and investigation at a later time when such areas have been determined, as well as continued consultation with NJHPO.

4.8.5 Historic Architectural Resources

Historic architectural properties located in the Project Corridor are summarized in Table 4.22 and discussed below by municipality.

4.8.5.1 Mansfield Township

The architectural APE in Mansfield Township contains one State Register-listed historic property that will be minimally impacted, the Scattergood-Wright House located at 1258 Hedding Road on the southbound side of the Turnpike. Placed on the State Register in 1978, the Scattergood-Wright House consists of a two-story brick Federal-era house erected in circa 1808, and four large farm outbuildings and a silo clustered around the yard north and west of the house.

The Proposed Project will result in the acquisition of approximately 0.30 acres for additional right-of-way from the Scattergood-Wright House's property in an area immediately adjacent to the Turnpike. This acquisition will not affect any buildings, structures, or objects standing on the property. The house's formal entrance faces southward towards Crafts Creek and away from the Turnpike. The house's rear entrance faces northward toward the Hedding Road overpass of the Turnpike located roughly 1,200 feet from the house. High shrubs and mature trees lining the north side of the house yard shield all views of the Turnpike and nearly all views of the overpass from the house, even during seasons when the trees lack foliage. The roof of the house is barely visible from the overpass during periods of no foliage. The sides and roofs of tall passing vehicles, i.e. tractor trailers, are visible through the leaf-barren tree limbs lining the northbound side of the Turnpike located about 1,000 feet west of the Scattergood-Wright House. Although the Turnpike will be closer to the Scattergood-Wright House by approximately 20 feet, this viewshed will not be changed substantially. In addition, nearly all views west from the house yard are obscured by the large barn and stable buildings standing immediately adjacent to Hedding Road and by a modern house located on the west side of Hedding Road. The slight modification of the Scattergood-Wright's parcel and the western viewshed do not introduce new elements into the historic property or change the characteristics of the property sufficiently to jeopardize its State Register eligibility. As a result, it is concluded that the Proposed Project will have no adverse impact on the Scattergood-Wright House historic property.

4.8.5.2 Bordentown Township

The architectural APE in Bordentown Township does not contain any National Register or State Register-listed or eligible historic properties. The current study has not recommended any historic buildings or structures identified through field survey of the APE in the township as potentially eligible. The Proposed Project will not impact any historic properties located in the Project Corridor in Bordentown Township.

Table 4.22
Impacts to Historic Architectural Resources
Identified within the APE

Approximate Location	Resource Name	Visual Impact	Physical Impact	County / Municipality	Block	Lot	Approx. Impact Area (acres)
Between Assiscunk Creek and Interchange 6 M.P.49.9 (Northbound)	Scattergood/Wright House	N	Y	Burlington / Mansfield Twp.	33.01	10.02	ROW 0.30
Between Int. 7 and 7A M.P. 55.1 - 55.4 (Southbound)	Singleton-Lathem-Large House Historic District	N	Y	Burlington / Chesterfield Twp.	103	4.01	ROW 0.88 Utility 0.38 Slope 0.26
Between Int. 7 and 7A M.P. 57.0 (Northbound)	North Crosswicks Historic District	N	Y	Mercer / Hamilton Twp.	2726	3 4 5	ROW 1.2 0.0 Slope 0.01
Between Int. 7 and 7A M.P. 57.5 (Northbound)	Lengyen Farm Historic Complex	N	N	Mercer / Hamilton Twp.	2732	39	0.0
Between Int. 7A and 8 M.P. 63.6 (Southbound)	Robbins House	N	Y	Mercer / Washington Twp.	19	16	ROW 1.56 Bldg Impact Res.
Between Int. 7A and 8 M.P. 65.5 (Northbound)	919 Old York Road	N	Y	Mercer / East Windsor Twp.	36	19	ROW 0.51 Utility 0.04 Slope 0.49 Bldg Impact Comm.
Between Int. 8 and 8A M.P. 69.8 (Northbound & Southbound)	Camden and Amboy Railroad Main Line Historic District	N	N	Middlesex / Cranbury Twp.	N/A	N/A	0.0

Source: The Louis Berger Group, May 2006.

4.8.5.3 Chesterfield Township

The architectural APE in Chesterfield Township contains one historic property listed on the National and State Register of Historic Places. The Singleton-Lathem-Large House historic property consists of a 24.5-acre parcel of mostly cultivated farmland situated on the north side of the Bordentown-Chesterfield Road overpass on the southbound side of the Turnpike. The property contains a two-story brick and frame house erected in circa 1750 and an early twentieth century barn, neither of which will be affected by the Proposed Project. The Proposed Project will result in the acquisition of approximately 0.88 acres for additional right-of-way and the purchase of a slope easement on approximately 0.26 acres and a utility easement on approximately 0.38 acres along the property's 150-foot long southern boundary with Bordentown-Chesterfield Road, and 680-feet long eastern boundary with the Turnpike. The house's main entrance looks southward through a mixed stand of mature and young trees and across the raised grade of the Bordentown-Chesterfield Road overpass of the Turnpike towards late-twentieth-century suburban housing on the south side of Bordentown-Chesterfield Road. Preliminary design plans call for the slight realignment of the Bordentown-Chesterfield overpass which will result in the raising of the overpass's grade directly south of the Singleton-Lathem-Large house's principal viewshed. However, this will not be substantively different from the current vista. The house's rear entrance looks northward towards cultivated fields, which will not be impacted. As such, the Proposed Project will not adversely impact the Singleton-Lathem-Large House historic property.

4.8.5.4 Hamilton Township

The architectural APE in Hamilton Township contains two National Register-eligible historic properties.

The North Crosswicks Historic District, determined eligible for listing on the National Register by the NJHPO in 2000, consists of a rural community erected primarily between 1740 and 1930 surrounding the crossroads of Old York Road, Crosswicks-Hamilton Square Road, and Broad Street on the northbound side of the Turnpike. Although the nearest building contributing to the historic district stands approximately 600 feet east of the Turnpike along the south side of Broad Street, the boundaries of the historic district abut the current Turnpike right-of-way on the northbound side. The Proposed Project will result in the acquisition of approximately 1.2 acres of land abutting the Turnpike's eastern right-of-way line for additional right-of-way. Mature tree growth in the first few lots east of the Turnpike will remain and limit views of the new right-of-way. The Proposed Project will not affect any buildings, structures or objects contributing to the historic district. Overhead electric lines and towers stand within the current historic district boundaries on two otherwise empty lots owned by Public Service Electric and Gas Company immediately east of the Turnpike. The third lot east of the Turnpike (5715 Broad Street) contains a one-story bungalow-type structure erected circa 1930 that is described in documents on file at the NJHPO as an intrusion into the historic district. This and other houses located along the southern side of Broad Street feature principal viewsheds facing northward parallel to the Turnpike and across a cultivated field. These buildings' rear viewsheds face southward, also parallel to the Turnpike. Further east, Broad Street turns slightly northeast changing the direction of views for buildings lining that street. However, both sides of the street are occupied along that stretch of Broad Street, thereby limiting primary views to buildings located immediately across the street instead of towards the Turnpike. Preliminary design plans also indicate a slight realignment of the Broad Street overpass of the Turnpike. This realignment is not expected to impact the viewsheds of any buildings contributing to the historic district. The new overpass will be visible primarily to motorists traveling westward on Broad Street through the historic district. However, this will not be a substantially different view from that currently available to motorists. These outlined changes will not introduce new elements into the landscape surrounding the historic district and will not change any characteristics that contribute to its National Register eligibility. The Proposed Project will have no adverse impact on the North Crosswicks Historic District.

The Lengyen Farm Complex, determined eligible for listing on the National Register by the NJHPO in 2001, consists of a large agricultural parcel located at 108 Old York Road on the northbound side of the Turnpike. The closest boundary of the Complex to the Turnpike is approximately 300 feet east of the existing Turnpike right-of-way. The complex's farmhouse stands approximately 2,500 feet east of the existing Turnpike with a primary viewshed facing southeastward, away from the Turnpike. The farmhouse's rear viewsheds are blocked by the property's barns and a thick stand of mature trees located north of the house near Doctors Creek. The Complex also contains two arms stretching west and northwest that abut the east side of Crosswicks-Hamilton Square Road. The Turnpike is visible at roughly 1,000 feet away from the western arm of the Lengyen Farm Complex. The northwestern arm, while much closer to the Turnpike (approximately 500 feet) is shielded by the heavy tree growth located along Doctors Creek. The Proposed Project will not result in any property acquisition from or viewshed modification to the Lengyen Farm Complex. As a result, the Proposed Project will have no adverse impact.

4.8.5.5 Washington Township

The architectural APE in Washington Township contains one historic resource recommended as eligible for the State Register, which is the Robbins House located at 245 Windsor-Carson Mill Road on the southbound side of the Turnpike. The property consists of a circa 1818 Federal-style house situated on a 23.8-acre parcel of primarily ornamental mowed turf. The Proposed Project will result in the acquisition of approximately 1.56 acres for right-of-way purposes along the property's entire eastern border with the Turnpike. This portion of the property is comprised of trees and shrubs that serve as a buffer between the remainder of the property and the Turnpike. The principal viewshed of the Robbins House looks southwestward down a tree-lined drive and away from the Turnpike. Views from the house's rear entrance are shielded by a large modern addition on the northeast corner of the house that completely obscures views of the Turnpike northeast of the house. The Proposed Project will neither introduce a new element into the landscape of the property nor change any characteristics that qualify the property for the State Register. Therefore, the Proposed Project will have no adverse impact on the Robbins House.

4.8.5.6 East Windsor Township

The architectural APE in East Windsor Township contains one historic resource recommended as being eligible for the State Register. The property, located at 919 Old York Road on the northbound side of the Turnpike, consists of a large circa 1850 house. The property also includes a pool and a commercial building which are non-contributing elements. The Proposed Project will require the acquisition of approximately 0.51 acres for additional right-of-way in the northwest corner of the nearly 12.5-acre, irregularly shaped parcel. Realignment of the overpass carrying Old York Road over the Turnpike also will require the acquisition of a slope easement of approximately 0.49 acres along the parcel's western boundary with Old York Road. The Proposed Project will not affect any building, structure, or object contributing to the eligible property. The principal viewshed of the house looks south away from the Turnpike and parallel to Old York Road. The rear entrance to the house faces north and looks onto the current alignment of the Turnpike, located roughly 600 feet to the north. Although the Turnpike will be closer to the house, the viewshed will not be substantially different from its current vista. Views west from the house are obscured by tall fire-escape towers appended to the historic building. The Proposed Project will not introduce a new element into the landscape of the eligible property and will not change any characteristics of the property that contribute to its eligibility. The Proposed Project will have no adverse impact on the potentially eligible historic resource at 919 Old York Road.

4.8.5.7 Cranbury Township

The architectural APE in Cranbury Township contains one historic property eligible for the State and National Registers, which is the Camden and Amboy Railroad Main Line Historic District. The

Camden and Amboy Railroad district consists of a linear historic resource running between the municipalities of Camden and South Amboy and determined eligible by the NJHPO in 1991. In the Project Corridor, this linear district runs adjacent to Hightstown-Cranbury Station Road and passes beneath the Turnpike at M.P. 69.9. The Proposed Project will widen the current bridge structure carrying the Turnpike over the district and will not affect the historic property. Portions of the historic rail line south of the Turnpike overpass have been previously removed. The Proposed Project will maintain the current alignment of the railroad and will not introduce an additional element into the landscape. Although the new, wider bridge structure will limit views from the railroad right-of-way, research has not indicated that there were any significant views from or of the railroad at this point historically. As a result the Proposed Project will have no adverse impact on the Camden and Amboy Railroad Main Line Historic District.

4.8.5.8 Monroe Township

The architectural APE in Monroe Township does not contain any National Register or State Register-listed or eligible historic properties. The current study has not recommended any historic buildings or structures identified through field survey of the APE in the township as potentially eligible. The Proposed Project will not impact any historic properties located in the Project Corridor in Monroe Township.

4.8.5.9 South Brunswick Township

The Project Corridor in South Brunswick Township does not contain any National Register or State Register-listed or eligible historic properties. The current study has not recommended any historic buildings or structures identified through field survey in the township as potentially eligible. The Proposed Project will not impact any historic properties located in the Project Corridor in South Brunswick Township.

4.8.5.10 East Brunswick Township

The Project Corridor in East Brunswick Township does not contain any National Register or State Register-listed or eligible historic properties. The current study has not recommended any historic buildings or structures identified through field survey in the township as potentially eligible. The Proposed Project will not impact any historic properties located in the Project Corridor in East Brunswick Township.

4.8.5.11 Milltown Borough

The Project Corridor in Milltown Borough does not contain any National Register or State Register-listed or eligible historic properties. The current study has not recommended any historic buildings or structures identified through field survey in Milltown as potentially eligible. The Proposed Project will not impact any historic properties located in the Project Corridor in Milltown.

4.8.6 Mitigation of Impacts

4.8.6.1 Archaeological Resources

Since the archaeological APE for the Proposed Project does not contain any identifiable Register-eligible or listed archaeological (historic or prehistoric) resources, it is not necessary to consider alternatives for avoidance or mitigation of impacts to archaeological resources. All proposed staging areas, wetland mitigation areas, and other work areas associated with the final design stage of the

Proposed Project have not been investigated for the presence of archaeological resources. As such, these areas will likely require an archaeological assessment and investigation at a later point in time, as well as continued consultation with NJHPO.

4.8.6.2 Historic Architectural Resources

Since the Proposed Project will potentially result in acquisition of property from seven Register-eligible or listed historic architectural properties or districts, it will be necessary to prepare an Application for Project Authorization pursuant to the New Jersey Register of Historic Places Act (N.J.S.A.13:1B-15.128 et seq.) and its implementing procedures outlined in N.J.A.C. 7:4. The NJHPO will review the application to determine whether takings of property from these historic properties constitute an encroachment. If the Proposed Project is determined to constitute an encroachment on any of these properties, then the application will be submitted to the Historic Sites Council for review.

As a means of minimizing any potential effect on historic architectural resources, proposed improvements or alterations including bridges, overpasses, parapets, barriers, and guardrails will employ compatible designs, materials, and colors that are in keeping with the current Turnpike styles.

4.8.7 Summary

Background research and reconnaissance surveys of the archaeological APE did not identify any features or ruins of taverns, school houses, or farmsteads within or immediately adjacent to the APE. However, one late 19th to mid-20th Century historic dump was identified during the subsurface archaeological testing conducted at the location of a proposed southbound on-ramp at Interchange 7A. This resource will be impacted by the Proposed Project; however, this resource does not appear to be eligible for the National Register or the State Register. Given these findings, the archaeological APE does not contain any identifiable Register-eligible historic archaeological resources that will be impacted by the Proposed Project.

The Proposed Project will potentially result in acquisition of property from seven Register-eligible or listed historic architectural properties or districts located in the Project Corridor. If the Proposed Project is determined to constitute an encroachment on any of these properties, then an application for encroachment authorization will be submitted.

4.9 Visual Quality and Aesthetics Impacts

4.9.1 Introduction

Visual and aesthetic conditions along the Project Corridor have been assessed for the Proposed Project in comparison to the No-Build Alternative. This assessment has included identification of existing corridor conditions and review of changes that would occur as a result of the Proposed Project. As described in Section 3.10, the 35-mile Project Corridor travels through a mix of developed and natural landscapes. The southern and central portions of the corridor are primarily rural in nature, while the northern portion is dominated by warehouses and moderate to dense suburban residential development. The landscape pattern in the corridor has been influenced by development radiating south from the greater New York Metropolitan Area over time. The new views from the road and of the road along both sides of the Turnpike are presented below by individual segment, from south to north. Design characteristics of the re-construction of existing local overpasses and design of the ramp flyovers will be consistent with the overall Turnpike "look." Visual impacts related to lighting have not been analyzed since minimal lighting is used along the Turnpike; lighting is provided at and in the vicinity of interchanges, toll plazas and service areas only. The installation of new noise barriers may include vegetative landscaping or trees, where safety factors and right-of-way permits.

4.9.2 Data Sources and Methodology

Since the Turnpike is already a part of the existing landscape, the methodology used to evaluate the visual quality and aesthetic impacts resulting from the Proposed Project along the corridor involved utilizing recent 2006 aerial photography, the project's preliminary design plans (including profiles and typical sections), field evaluations and information describing previous existing conditions.

4.9.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes and associated landscaping within the Turnpike right-of-way boundary would remain. As a result, the visual quality and aesthetics along the Project Corridor would remain the same as described in Section 3.10, with some modification to the nearby landscape due to programmed and/or approved residential and commercial developments in the area.

4.9.4 Proposed Project Impacts

4.9.4.1 Assiscunk Creek to Interchange 6

Northbound Side of the Turnpike

View from the Road

For most of the Turnpike's length in this segment, the surrounding landscape will be visible in most areas due to the elevated nature of the Turnpike and the removal of the narrow band of woodlands and understory vegetation which provided screening. In some sections, views from the Turnpike are not expected to change, including north of Crafts Creek, which is below the general grade of the surrounding landscape and north of Hedding Road, where a berm parallels the Turnpike. Additionally, large sections of forested tracts located intermittently beyond the right-of-way line provide screening. The steel towers and overhead electric lines associated with the PSE&G's New Freedom – Deans Line will be visible. Several stormwater detention basins of varying size will be incorporated into the landscape adjacent to the Turnpike at several locations. The view of the Scattergood/Wright House, the only visually-sensitive resource, will only be of the roof, which is barely visible from the overpass at Hedding Road even during periods of no foliage.

View of the Road

The Turnpike would be more visible from the surrounding area; however, given the limited number of population centers in the vicinity, the opportunity for views of the roadway are limited as well. The Turnpike would be more visible from the Scattergood/Wright House; however, the intervening high shrubs and mature trees lining the north side of the house's yard shield all views of the Turnpike and nearly all views of the overpass at Hedding Road from the house, even during seasons when the trees lack foliage. The Turnpike overpass at Hedding Avenue will be more visible from the surrounding area.

Southbound Side of the Turnpike

View from the Road

For much of its length within this segment, the surrounding rural landscape will remain visible from the Turnpike, though tracts of forested areas beyond the right-of-way line are located intermittently across the landscape. Several stormwater detention basins of varying size will now be incorporated into the landscape at various locations. The Burlington County landfill will remain the dominant feature in this area and will be more visible, though forested areas would continue to provide muted-levels of screening.

View of the Road

Because the narrow band of woodlands and understory vegetation along the Turnpike would be removed, the roadway will be more visible from the surrounding area; however, given the limited number of population centers in the vicinity, the opportunity for views are limited. There are no visually-sensitive resources that could be affected by altered views of the roadway located in this segment of the corridor.

4.9.4.2 Interchange 6 to Interchange 7

Northbound Side of the Turnpike

View from the Road

For much of its length within this segment of the Project Corridor, views of the surrounding landscape will change. The narrow band of woodlands and understory vegetation will be removed, increasing visibility of the surrounding landscape, including the steel towers and overhead electric lines associated with the PSE&G's New Freedom – Deans Line. A concentration of large tracts of forested areas beyond the Turnpike right-of-way line is located in the middle section of this segment, limiting the view of the landscape beyond it. The Turnpike is typically elevated along two-thirds of the segment, becoming below-grade in the northern section, which either expands or limits the view of the surrounding landscape or Turnpike. Where the ramps for Interchange 7 become elevated and the Turnpike rises to cross over U.S. Route 206, the view is moderately vivid of the surrounding landscape. Because of the commercial structures and overhead electric transmission lines present, this view would remain only moderately intact and unified.

View of the Road

A majority of the Turnpike in this segment would be visible from the surrounding area; however, given the limited number of population centers in the vicinity, the opportunity for views of the Turnpike are limited. Several moderate to large upland forests also serve to screen the view of the Turnpike from portions of the surrounding area.

Southbound Side of the Turnpike

View from the Road

For much of its length within this segment of the Project Corridor, the views of the surrounding landscape will change. The narrow band of woodlands and understory vegetation will be removed and is proposed to be replaced with a noise barrier in the southern section. The Turnpike's elevation will be

typically raised above the surrounding topography except at Old York Road, where it would be below the surrounding grade. At Hedding-Mansfield Road and U.S. Route 206, the increased elevation of the Turnpike over the surrounding landscape would remain, but at Old York Road the Turnpike would be below-grade and views will be obstructed. The presence of the steel towers and overhead electric lines associated with the PSE&G's Trenton – Burlington Line will continue to be a visible artificial feature along the corridor.

View of the Road

The majority of the Turnpike in this segment of the Project Corridor would be entirely or partially visible, except along the southern section where a noise barrier would obstruct the view. Even with new residential development in the area, the limited number of population centers in the vicinity will continue to limit the opportunity for views of the road. There are no visually-sensitive resources in this segment of the corridor. The Turnpike overpass at Hedding Avenue will remain partially visible from that road.

4.9.4.3 Interchange 7 to Interchange 7A

Northbound Side of the Turnpike

View from the Road

For much of its length within this segment of the Project Corridor, the view of the surrounding landscape will change. The narrow band of woodlands and understory vegetation adjacent to the Turnpike will be removed and potentially replaced by noise barriers in sections, thereby limiting the view of the surrounding landscape. Noise barriers are proposed be located starting north of Bordentown-Chesterfield Road to the north side of Groveville Road, and north of Broad Street to the south side of Crosswicks-Hamilton Square Road. The placement of the noise barriers will effectively screen the view of the surrounding landscape. Tracts of forested areas either adjacent to the Turnpike right-of-way line or upland spaced intermittently along the corridor will also screen the surrounding landscape. The Turnpike's elevation is generally at-grade with the surrounding topography, with minor increases in elevation at various local roadway crossings. Six local bridges and the ramps at Service Area 6N and Interchange 7A would remain, with accompanying retaining walls, embankments and abutment structures. Several stormwater detention basins adjacent to the Turnpike will also be incorporated into the landscape at various locations.

View of the Road

Much of the Turnpike in this segment of the Project Corridor will either be visible or partially visible from the surrounding landscape, except where noise barriers are proposed to be located. Screening of the Turnpike would also be accomplished by the numerous moderately to large-sized forested areas located either immediately adjacent to the Turnpike right-of-way or upland. There are two visually-sensitive resources in this segment, the North Crosswicks Historic District and the Lengyen Farm Complex Historic District. The Turnpike would not visible from the nearest building in the North Crosswicks Historic District, due to dense vegetation and the fact that the roadway is depressed in this area, passing underneath Broad Street. The Turnpike would remain visible from the Lengyen Farm Complex Historic District.

Southbound Side of the Turnpike

View from the Road

The views of the surrounding landscape in this segment of the Project Corridor will change as a result of the Proposed Project. The surrounding landscape will not be visible or would be barely visible due to the potential placement of noise barriers or berms in sections, which would effectively block the view from the Turnpike. The Turnpike's elevation fluctuates between above- and below-grade in this segment, which would also serve to either expand or limit the view of the surrounding landscape.

View of the Road

Much of the Turnpike in this segment of the Project Corridor would continue to be partially visible from the surrounding landscape, due in part to the presence of noise barriers and adjacent woodlands. Views from the Singleton-Lathem-Large House Historic District, the only visually-sensitive resource in the southbound side of the Turnpike in this area, would not change. The roadway would continue to be screened due to heavy vegetation and the fact that the roadway is depressed in this area, passing underneath Bordentown-Chesterfield Road.

4.9.4.4 Interchange 7A to Interchange 8

Northbound Side of the Turnpike

View from the Road

The view of the surrounding landscape in this segment of the Project Corridor will change as a result of the Proposed Project. The narrow band of woodlands and understory vegetation will be removed and potentially replaced with noise barriers. These barriers, coupled with large tracts of forested areas that would remain, will either partially or entirely shield views of the landscape beyond them. Several stormwater detention basins will be incorporated into the landscape adjacent to the Turnpike at several locations.

View of the Road

Much of the Turnpike in this segment of the Project Corridor will be screened from the surrounding landscape by the potential presence of several noise barriers, coupled with several large forested tracts that will continue to be located intermittently along the corridor. The Assunpink Wildlife Management Area and East Windsor Regional Park are undeveloped and heavily vegetated/forested. These parcels would continue to screen the view of the Turnpike from the surrounding landscape.

Southbound Side of the Turnpike

View from the Road

Much of the surrounding landscape in this segment of the Project Corridor would not be visible or would be partially visible from the Turnpike, as a result of screening provided by potential noise barriers, and because of the large tracts of forested areas adjacent to the Turnpike that would remain. A stormwater detention basin will be incorporated into the landscape north of Old York Road.

View of the Road

Much of the Turnpike within this segment of the Project Corridor will be screened from the surrounding landscape due to the potential presence of noise barriers, coupled with several large forested areas that will remain. With the partial or total removal of the band of woodlands and understory vegetation adjacent to the right-of-way, the Turnpike will be visible from Washington Community Park and Lenox County Park. The Turnpike will not be visible from the Robbins House, due to the surrounding forested area and dense vegetation on the property that would be left in place. The Assunpink Wildlife Management Area and Turnpike Park are both undeveloped and heavily vegetated/forested; these parcels would continue to screen the view of the Turnpike from the surrounding landscape. The various local roadway realignments may cause the Turnpike to be visible or partially visible from the surrounding area in certain locations.

4.9.4.5 Interchange 8 to Interchange 8A

Northbound Side of the Turnpike

View from the Road

Much of the surrounding landscape in this segment of the Project Corridor will remain visible or partially visible from Turnpike, due to the partial or total removal of the narrow band of woodlands and understory vegetation that screens the surrounding landscape. Moderate to large forested areas located intermittently in the vicinity will continue to provide additional screening of the landscape beyond them. As the Turnpike rises in elevation to cross over N.J. Route 33, motorists will be afforded a moderately vivid view of the surrounding landscape, which includes two hotels and a restaurant. Because of the sharply varying architectural styles of these structures, as well as the presence of other visual "clutter" along Route 33, this view would continue to be only moderately intact and unified. As the Turnpike rises in elevation to cross over the former Camden and Amboy Railroad, motorists would be afforded a moderately vivid view of the surrounding landscape, which is only moderately intact and unified due to the intrusion of several warehouses and industrial buildings into the otherwise largely undeveloped landscape. A new noise barrier proposed to replace the existing 20-foot high noise barrier south of N.J. Route 32 will continue to screen the view of the surrounding landscape. Numerous stormwater detention basins of various sizes will be incorporated into the landscape at various locations in this segment.

View of the Road

Much of the Turnpike in this segment of the Project Corridor would continue to be either partially or entirely visible from the surrounding landscape. The removal of the narrow band of woodlands adjacent to the roadway would increase visibility in these areas; however, a new noise barrier proposed to replace the existing 20-foot high noise barrier located south of Route 33 would continue to screen the view of the road at this location. In addition, numerous moderate to large forested tracts located either immediately adjacent to the Turnpike right-of-way line or upland would continue to serve to screen the view of the roadway from portions of the surrounding area.

Southbound Side of the Turnpike

View from the Road

The surrounding landscape in this segment would be either partially or entirely visible from the Turnpike due to the removal of the narrow band of woodlands and understory vegetation adjacent to the roadway. However, numerous forested areas located primarily in the southern section, either

adjacent to Turnpike right-of-way line or upland, will continue to provide screening of the landscape beyond them. North of Cranbury-Half Acre Road to Interchange 8A, Service Area 7S and subsequent adjacent warehouses and offices would continue to be visible. The Turnpike's elevation change at Hightstown-Cranbury Station Road would continue to provide views of the surrounding agricultural landscape and at Interchange 8A, provide views of the surrounding commercial and residential development. Numerous stormwater detention basins will be incorporated into the landscape at various locations.

View of the Road

As a result of the Proposed Project, much of the Turnpike in the southern section of this segment of the Project Corridor will be partially visible from the surrounding landscape due to the removal of the narrow band of woodlands and understory vegetation currently adjacent to the roadway. Moderately-sized forested areas located adjacent to the Turnpike right-of-way line and upland would remain and continue to provide screening of the Turnpike. Farther north, the Turnpike would continue to be visible from the surrounding landscape. However, in some areas of this segment the Turnpike's elevation is below-grade, which would continue to limit the view of the roadway. The Turnpike will become more visible from the three local roadways that it traverses.

4.9.4.6 Interchange 8A to Interchange 9

Minimal new right-of-way is proposed to be acquired in this segment of the Project Corridor, and all existing noise barriers will remain in place. However, two new noise barriers are proposed on the northbound side of the Turnpike, which will reduce the view from the road and of the road in these areas. Consequently there would be little change to this segment's aesthetics or visual resources.

4.9.5 Mitigation of Impacts

4.9.5.1 View from the Road

Although the Proposed Project would result in changes in views from various locations along the roadway, none of these changes would constitute an adverse impact. In addition, the Turnpike's user population (i.e., motorists) is a transient population that only experiences these views on a temporary basis. Consequently no mitigation measures would be necessary.

4.9.5.2 View of the Road

Although the Proposed Project would cause the Turnpike to be more visible from certain areas along the Project Corridor, these changes are considered to be minimal in nature. In addition, no unique visual resources would be adversely affected. In areas where new noise barriers are proposed, the elimination of views of the road to the residents would be viewed as a positive impact by many. No mitigation measures are necessary.

4.9.6 Summary

The Proposed Project would result in minor changes to the aesthetics and visual character of the Project Corridor. However, the Proposed Project is the widening of an existing roadway that would generally not introduce new visual elements into the surrounding landscape. All resulting impacts to the visual character of the Project Corridor are considered to be minor in nature and, in areas where new noise barriers are proposed, may be considered to be positive in nature with respect to the residents living adjacent to the Turnpike.

4.10 Soils and Geology

4.10.1 Introduction

An important potential impact to soils and geology that could result from the Proposed Project is soil erosion and sedimentation during the construction period. This erosion has a direct impact on water quality by the introduction of suspended solids and may also affect biota in receiving waterways. The Proposed Project will expose large areas to erosion during construction. Since the majority of sediment is usually eroded during grading operations, sediment will follow the slope of the roadway down to drainage ditches or culverts and then to waterbodies.

The New Jersey Department of Environmental Protection (NJDEP) has designated certain geologic strata in the state which, due to the presence of certain sulfide compounds, have the potential to oxidize upon exposure to the elements, creating sulfuric acid.

4.10.2 Data Sources and Methodology

The methodology used to identify soil impacts consisted of reviewing the Natural Resources Conservation Service (NRCS) and the New Jersey GIS databases. Upon review of these data sources, the Proposed Project alignment was overlaid on the soils mapping to identify potential impact areas. NJDEP's *Technical Manual for Land Use Regulation Program Bureau of Inland and Coastal Regulations Stream Encroachment Permits;* the state Department of Agriculture's *Standards for Soil Erosion and Sediment Control in New Jersey* and an NRCS article entitled *Understanding Soil Risks and Hazards* (2004) were reviewed to address any potential impacts.

The methodology used to identify geologic impacts consisted of reviewing the *Geologic Map of New Jersey*, the New Jersey Geology Survey's web site and previous studies conduced along the Project Corridor. Upon review of these data sources, the Proposed Project alignment was overlaid onto the geologic mapping to identify potential impact areas.

4.10.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no direct or indirect impact to existing soils or geologic features in the Project Corridor, nor would there be any new exposure of acid-producing soils.

4.10.4 Proposed Project Impacts

4.10.4.1 Potential Soils Impacts

Construction Impacts

The following soils located within the Project Corridor are classified as Highly Erodible Land (HEL): the *FrmD* Freehold; the *KeoC*, *KeoD*, *KeoE* Keyport series; the *Saad, SaaE* Gullied Land series; and the *SagC3* Sassafras series (See Appendix A). Highly erodible soils require additional design details when laying out potential Best Management Practices (BMPs) to control erosion.

The *on-site* soil impacts of construction activities include topsoil removing, grading, and filling which can reduce soil quality on the site.

The *off-site* soil impacts from erosion include excess nutrients and excess sediment reaching local waterways. Erosion creates two major water quality problems in surface waters and drainageways; these are the presence of excess nutrients and excess sediment. Both impacts create unwanted biological growth and turbidity that degrades the habitat for fish and other aquatic organisms. Sediment can accumulate in stream channels, lowering the flow capacity of the stream.[8]

The primary potential impacts in the Project Corridor are acid-producing soils and soil erosion.

Although the issue of acid-producing soils is largely the result of the characteristics of the underlying geologic formations, acid-producing soils are defined as those soils with a pH of 4 or less, or which contain iron sulfide minerals (pyrite and marcasite). The geologic formations in the Project Corridor which commonly contain acid-producing soils are the Magothy Formation, Englishtown Formation, Merchantville Formation, and Woodbury Formation. The acid-producing deposits within the Project Corridor are located near the center of the Project Corridor between mileposts 64.0 and 66.0 and in the northern quarter of the Project Corridor between mileposts 72.0 and 83.0. See Figure 3-13 in Section 3.0 for the locations of these geologic formations.

Land disturbance and excavation are the major impact to acid-producing soils resulting from construction. These activities expose the soil and or underlying bedrock to air, which causes chemical oxidation to occur, resulting in the production of sulfuric acid and soil pH levels falling to pH 4 and lower. Most vegetation is incapable of growth at this pH level and adjacent land and receiving waters would be negatively impacted by the acid leachate.

With the exception of a few areas (specifically between mileposts 64.0 and 66.0 and between mileposts 72.0 and 73.5), most of the acid-producing deposits occur north of Interchange 8A (between mileposts 73.5 and 83.0), where Proposed Project construction will be limited to paving of an additional traffic lane in each direction using embankment, bridges, drainageways, and other features that were previously constructed. As a result, the potential impact to acid-producing soils along that segment of the Proposed Project is unlikely, except for the areas where detention basins that are proposed to be constructed.

Operational Impacts

Because any exposed soils would be seeded at the conclusion of the construction phase and surface water runoff systems, such as grass swales, would be utilized to promote the settling of eroded particles, the Proposed Project operational phase is anticipated to have minimal impact to soils in the Project Corridor.

4.10.4.2 Geology Impacts

The impacts to geology from the Proposed Project's construction and operation will mainly affect groundwater and soils. These soils will be exposed temporarily to potential erosion. The minor excavation and grading necessary to construct the Proposed Project would not reach bedrock or affect the underlying geology of the Project Corridor, as the shallowest bedrock in the corridor is approximately 50 feet below ground surface.

Proposed impacts to the groundwater table will be minimal as new impervious areas (paved road surfaces) will be directed to groundwater recharge areas. Design for stormwater treatment facilities will not be located or encroach upon groundwater tables. These treatment facilities will be located to treat stormwater before it enters into the groundwater table.

[8] NRCS - *Understanding Soil Risks and Hazards*, 2004

4.10.5 Mitigation of Impacts

4.10.5.1 Mitigation of Soil Erosion Impacts

The Authority will develop a Soil Erosion and Sediment Control Plan (SESC) and work closely with the Burlington County Soil Conservation District, Mercer County Soil Conservation District and the Freehold Soil Conservation District to ensure that the approved SESC Plan is implemented.

The SESC Plan will ensure that adequate measures are available to prevent onsite and offsite impacts to Project Corridor soils. Adding mulch, seeding, and providing sod protect the soil from erosion. Straw bales, silt fences, gravel bags, narrow grass strips or buffers, vegetative barriers, and terraces and diversions catch sediment and shorten the length of the erosive surface. Combinations of cover and structural practices help to control erosion and sedimentation and improve soil quality. Some temporary measures, such as a silt fence at the base of the slope, do not reduce the hazard of erosion on the slope but trap some of the sediment leaving the slope. Following are some basic principles of erosion control on construction sites which may be utilized on this project:

- Divide the project into smaller phases, clearing smaller areas of vegetation.
- Schedule excavation during low-rainfall periods when possible.
- Excavate immediately before construction instead of exposing the soil for months or longer.
- Cover disturbed soils with vegetation or mulch as soon as possible and thus reduce the hazard of erosion.
- Divert water from disturbed areas.
- Control concentrated flow and runoff, thus reducing the volume and velocity of water from work sites and preventing the formation of rills and gullies.
- Minimize the length and gradient of slopes (e.g., use bench terraces).
- Prevent the movement of sediment to offsite areas.
- Inspect and maintain all structural control measures.
- Install windbreaks to control wind erosion.
- Avoid soil compaction by restricting the use of trucks and heavy equipment to limited areas.
- Break up or till compacted soils prior to vegetating or placing sod.
- Avoid dumping excess concrete or washing trucks onsite.

Soil will be exposed during construction. The exposed area will be minimized and a protective cover will be established as quickly as practicable. Conservation practices that provide immediate permanent cover (sod) or provide intermittent cover (mulching and seeding) are very effective in controlling erosion and runoff. Other practices, such as diversions and terraces, also help to control erosion and runoff. They provide temporary protection until vegetation or sod becomes established, and they provide permanent protection for the site.[9]

4.10.5.2 Mitigation of Acid-Soils Exposure Impacts

To prevent or minimize the potential of exposing acid-producing deposits, NJDEP *Technical Manual for Land Use Regulation Program Bureau of Inland and Coastal Regulations Stream Encroachment Permits (*May 1994*)* describes pre-construction procedures to identify the possible presence of acid-producing deposits. These include visual and chemical examination of boring samples. If acid-producing deposits are identified, mitigation procedures that minimize exposure through prompt burial and the use of vegetative cover should be undertaken.

[9] USDA - Understanding Soil Risks and Hazards, Issued 2004

High acid-producing soils will necessitate special practices if vegetative cover techniques are contemplated for soil erosion control. The *Standards for Soil Erosion and Sediment Control in New Jersey (*Adopted July 1999*)* requires that the temporary stabilization of acid soils should be with mulch only, not vegetative cover. Prior to seedbed preparation for permanent vegetative cover, acid soils should be covered with a minimum of 12 inches of soil with a pH greater than or equal to 5.

4.10.6 Summary

The Proposed Project avoids environmental impacts where possible. Where unavoidable impacts occur, suitable mitigation measures would be taken to ensure that the Proposed Project would not result in significant adverse environmental impacts.

Land disturbance and excavation are unavoidably necessary within the Project Corridor, and soils and some acid-producing soils will be exposed during construction. Planning is the key to the success of limiting the impacts to the surrounding natural resources.

Soil erosion can be controlled and minimized by following some of the above-mentioned basic principles of erosion control on construction sites, implementation of erosion control plans in a timely manner, frequent inspection and maintenance of erosion controls, timely removal of sediment from basins, removal of temporary structural controls and installation of permanent vegetation at project completion. Also careful adherence to the construction sequence and an approved Soil Erosion and Sediment Control Plan prepared in accordance with the *Standards for Soil Erosion and Sediment Control in New Jersey* will facilitate the control and management of soil erosion.

Environmental impacts can be minimized when the possible hazards of acid-producing soils are recognized prior to construction activities and measures are taken to address them. Adequate planning should include implementation of a detailed acid sulfate management plan and the education of design and construction staff as well as consulting stakeholders and the community. These impacts can be reduced by implementing procedures given in Section 2.5 of NJDEP's *Technical Manual for Land Use Regulation Program Bureau of Inland and Coastal Regulations Stream Encroachment Permits,* Section 7:13-3.7 of the New Jersey *Flood Hazard Area Control Act Rules* (N.J.A.C. 7:13) and Section 1-1 entitled "*Management of High Acid Producing Soils*" contained in the *Standards for Soil Erosion and Sediment Control in New Jersey.*

4.11 Water Resources

4.11.1 Introduction

Impacts to water resource elements located within the Project Corridor are discussed in this section. Specifically, construction and operational impacts to both surface water and groundwater are discussed, as well as applicable mitigation measures that can be implemented in order to reduce or eliminate these impacts.

4.11.2 Data Sources and Methodology

As a part of the NJDEP permitting process, a key review component will be compliance with applicable stormwater and water quality regulations. Examination of the potential impacts to the water resources of the Project Corridor will yield insight into measures which can be implemented to attenuate the environmental impact of potential water pollution. The *New Jersey Stormwater Management Rule* (N.J.A.C. 7:8) addresses runoff quantity; runoff quality and groundwater recharge standards.

An assessment of the potential impacts to water resources along the Project Corridor has been prepared based on field reconnaissance and on information compiled and developed through research, map, GIS data and survey review, as well as a review of the Turnpike's "As-Built" plans. Additional information regarding the water quality of streams in the corridor has been obtained from NJDEP's Bureau of Water Quality Standards and Assessment, which is responsible for classifying the state's surface waters in order to protect aquatic life and human health.

NJDEP's *New Jersey Stormwater Best Management Practices Manual* was used to clarify and explain the design and performance requirements of N.J.A.C. 7:8. The planning for potential future use of Best Management Practices (BMP) to mitigate for potential stormwater impacts was guided by the methodology provided in this manual.

The New Jersey Geological Survey's *Guidelines for Delineation of Well Head Protection Areas in New Jersey* was utilized to describe the process by which Well Head Protection Areas are delineated. This publication also describes the purpose of the Well Head Protection Program and the importance of preventing groundwater pollution within these sensitive areas.

Geographic Information System (GIS) data provided by NJDEP's Bureau of Geographic Information Systems were also used to identify potential water resource issues or impacts within the Project Corridor. This GIS data yielded spatial and attribute data which allowed for both a site-specific and a watershed-wide analysis of the potential water resource impacts that could result from the Proposed Project. The GIS data were used extensively to derive the impact assessment for Public Community Water Supply wells and their associated Well Head Protection Areas located in or near the Project Corridor.

4.11.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. The water resources of the Project Corridor would remain as they currently exist; there would be no impacts to water resources in the corridor.

Implementation of the No-Build Alternative would allow for the continued migration of non-point source pollution from stormwater runoff from the impervious surfaces of the Turnpike into adjacent surface waterbodies and the groundwater table. Currently, no treatment of stormwater runoff occurs.

4.11.4 Proposed Project Impacts

4.11.4.1 Construction Impacts

Surface Water

Preventing impacts from construction-period surface runoff in the Project Corridor will be addressed through an approved SESC Plan. See Section 4.10.

Groundwater

The recharge area to be lost due to roadway construction can be substantial. The entire Project Corridor crosses the recharge zone of the New Jersey Coastal Plain Aquifer system, as discussed in Section 3.12.4. Potential impacts to groundwater quality could result as surface runoff infiltrates

surface deposits and can result from spills or leaks during construction, pollution from construction equipment, mechanical repairs, and the storage of fuel, oil, and cleansing agents at construction sites.

4.11.4.2 Operational Impacts

Surface Water

Because different portions of the Proposed Project pass through different drainage areas, highway runoff will drain to different drainage areas. The proposed alignment was subdivided into segments that correspond to these drainage areas. These drainage patterns were applied to the impact analysis. A discussion of the different drainage areas is provided in Section 4.11.5.2.

The additional travel lanes that will be provided in the Project Corridor and the resulting increase in impervious area may cause degradation of the surface water quality in the surrounding areas and the downstream watersheds due to the discharge of stormwater runoff. In addition, as traffic volumes on the Turnpike increase, the amount of automotive pollutants deposited on impervious surfaces is anticipated to increase, thereby increasing the pollutant load of stormwater runoff discharging into adjacent waters.

Also, the additional travel lanes will result in an increase in the amount of deicing chemicals that will be used during the winter months. Deicing chemicals applied to the roadway during a storm event are contained in the runoff of a subsequent rainfall and are also gradually released by melting ice and snow over a period of time. Contaminated runoff will be collected in storm sewer systems along the Turnpike to ultimately discharge to one of the 28 streams that flow through the Project Corridor. In general, runoff entering a stream dilutes quickly, and the discharge of stormwater to receiving waters will remain well below regulatory criteria and is therefore not expected to have an adverse effect on aquatic biota. Consequently, the influx of deicing chemicals in the Project Corridor will not result in any adverse impacts.

Groundwater

The New Jersey Department of Environmental Protection's Stormwater Management Rule mandates that quantifiable groundwater recharge requirements be satisfied. However, this aquifer is highly susceptible to contamination through its recharge zone from a number of sources, including but not limited to, chemical spills, stormwater runoff and highway deicing. A component of natural recharge to the deeper layers of the aquifer system occurs by vertical leakage from the upper layers. This vertical leakage accounts for a small percentage of the total amount of recharge; however, over a large area and a long period of time, the amount of water transmitted can be substantial.

Well Head Protection Areas (WHPAs) are areas calculated around Public Community Water Supply (PCWS) wells in New Jersey that delineate the horizontal extent of groundwater captured by well pumping at a specific rate over a two-, five-, and twelve-year period of time for confined wells. Well No. 2803187 (MTMUA Well 1T) is located at Service Area 7S in Cranbury Township. Both Tier 1 (two-year time of travel) and Tier 2 (five-year time of travel) of this well's WHPA are located on Authority property. The elongated WHPA zones indicate that the regional groundwater flow direction is directed towards the Turnpike. As such, the WHPA zones extend away from the Turnpike and into an adjacent agricultural field. No construction or disturbance will occur at Service Area 7S in any WHPA zone of this well.

Only the Tier 3 (12-year time of travel) WHPA zones of four additional wells extend into the Project Corridor. NJDEP has stated in NJGS Open File Report 03-1, *Guidelines for Delineation of Well Head Protection Areas in New Jersey* that "the purpose of Tier 3…is to ensure sufficient monitoring of

potential pollution sources so that timely and appropriate responses may be made. Theoretically, Tier 3 could extend to the boundaries of the complete zone of contribution. However, the WHP Technical Advisory Committee determined that such an extensive area is not needed in New Jersey."

Deicing chemicals (either sodium chloride or calcium chloride) in snow that is plowed to form roadside snow banks and in spray from passing cars may potentially enter the groundwater system through infiltration where impervious surfaces are not present. The chloride contained in these chemicals affects the taste of water supplies, sodium poses a health risk to salt-sensitive people on salt-restricted diets, and calcium affects the hardness of water.

4.11.5 Mitigation of Impacts

Any potential impacts to water resources resulting from the Proposed Project will be minimized by the implementation of appropriate construction procedures and design features, both during the construction period and the long-term operational period. A "*Highway Agency Stormwater General Permit Post-Construction Program Design Checklist for Individual Projects*" will need to be completed to document compliance with applicable NJDEP regulations, particularly N.J.A.C. 7:8.

The operation and maintenance of the storm sewer systems along the Turnpike is currently governed by a Highway Agency Stormwater General Permit (NJPDES General Permit No. NJ0141887) issued by NJDEP to the Authority. This permit addresses stormwater quality issues related to roadway expansion, repaving and existing impervious areas along the Turnpike by requiring the formulation of a stormwater management program and implementation of specific permit requirements referred to as Statewide Basic Requirements (SBRs). SBRs require the Authority to implement approved Best Management Practices (BMPs). All SBRs and related BMPs contain minimum standards, measurable goals, and implementation timelines. Roadway expansion and repaving associated with this project is addressed, in part, by requiring the Authority to comply with applicable design and performance standards established under N.J.A.C. 7:8. The implementation of these design and performance standards will ensure that long-term measures are enacted to ensure that BMPs installed during the project construction are maintained and continue to function as originally designed.

The current roadway drainage systems located along the Turnpike discharge untreated stormwater directly into adjacent surface waters. N.J.A.C. 7:8 addresses stormwater runoff quantity, quality and groundwater recharge standards. These design and performance standards will aid in mitigating the impact caused by an increase in impervious area and associated runoff through the use of extended detention basins, bio-retention basins and manufactured treatment devices. The approximate locations of the basins are shown in Figure 4-1a through 4-1f.

Adverse impacts to groundwater quality are not expected to result from the Proposed Project due to the strategic use of stormwater management BMPs which will treat the stormwater before any groundwater recharge can occur. However, any chance that potential impacts to the Coastal Plain Aquifer System and shallow wells in the vicinity of the Project Corridor will occur can be minimized in advance by the implementation of appropriate construction and operational procedures and design features that promote attenuation of pollutants in the unsaturated zone and prevent intrusion into the groundwater table. These construction and operational mitigation measures are described in the sub-sections below.

4.11.5.1 Mitigation of Construction Impacts

Surface Water

The protection of Project Corridor surface waters and downstream waterbodies will be a priority during the construction of the Proposed Project. The guidelines and standards outlined in the

Standards for Soil Erosion and Sediment Control in New Jersey will govern the design, implementation and maintenance of soil erosion and sediment control measures intended to prevent soil erosion and maintain and prevent the degradation of water quality throughout the Project Corridor. During the design process, advice and guidance will be solicited from local soil conservation districts as well as NJDEP. This advice and dialogue will help to identify potential surface water pollution sources prior to construction so effective measures or construction procedures that are aimed at preventing water resource degradation during the course of construction activities can be incorporated into the Proposed Project's final design.

During construction, special emphasis will be placed on the proper maintenance and replacement of water pollution prevention measures. Using the inspection and maintenance timeline recommended by the *Standards for Soil Erosion and Sediment Control in New Jersey*, pollution control measures will be inspected after major rainfall events and on a specified schedule to ensure these measures perform as designed. Efforts will be made to limit land disturbance to the minimum area necessary for construction activities to occur.

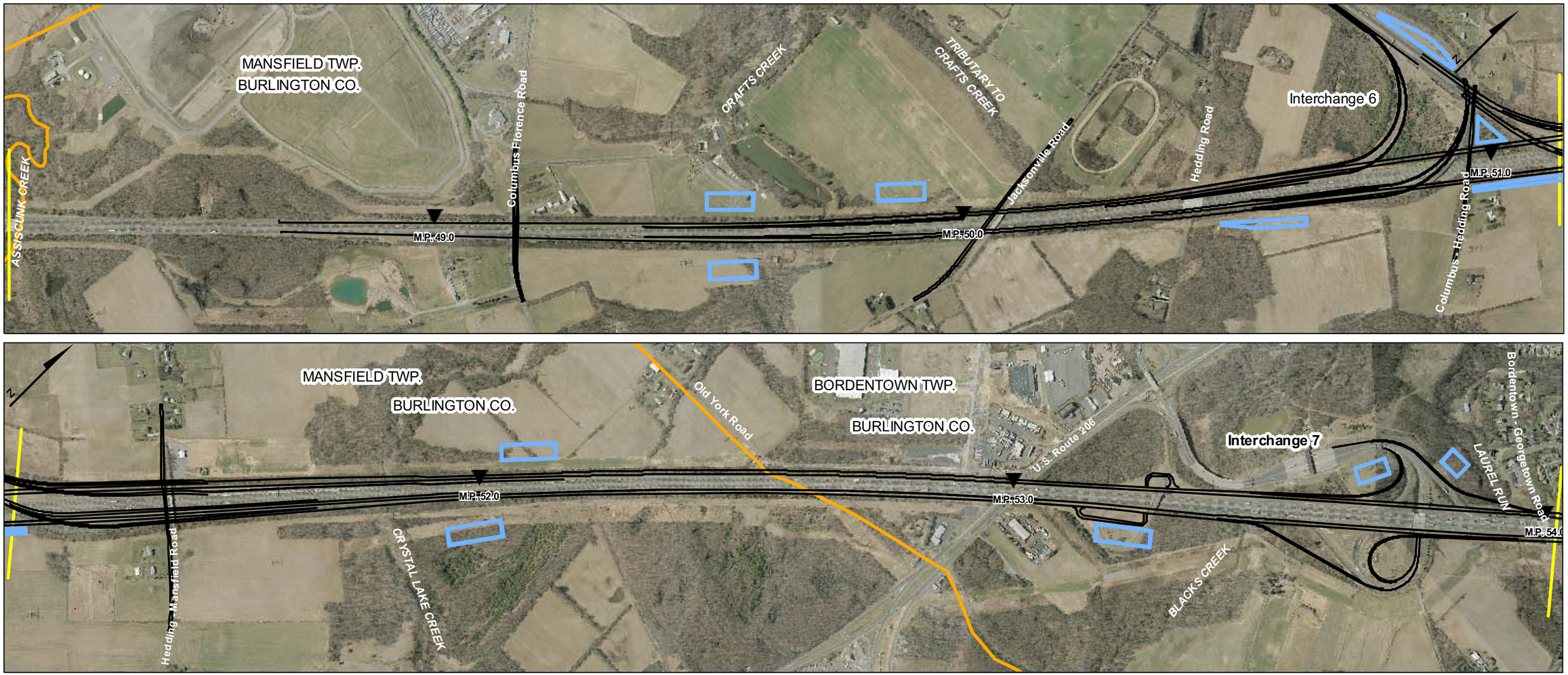
Particular attention will be paid to prevent water pollution from occurring in areas where sensitive ecological habitats or environmental resources are located. In these instances, pollution control measures or procedures which exceed the standards required by the local soil conservation district may be implemented to protect previously-identified special environmental resources.

Groundwater

Measures will be implemented to ensure that no groundwater contamination occurs during the construction of the roadway. Any spills or leaks which occur during construction would be cleaned up immediately by removing and disposing of contaminated soils at an off-site location in a proper, legal manner. Equipment and parking areas should be paved or thoroughly compacted so that surface material is impermeable. Similarly, mechanical repairs and the storage of fuel, oil and cleansing agents should be in contained, paved areas. All efforts would be made to prevent the hydraulic trespass of pollutants from impervious areas to the groundwater table during construction. The same measures that protect the quality of groundwater will also protect the delineated WHPAs located adjacent to the Project Corridor.

To avoid any potential contamination of Public Community Water Supply wells whose Tier 3 WHPA zone extends into the Project Corridor, all stormwater management facilities that could potentially infiltrate runoff will be lined with clay to prevent infiltration from occurring. This measure seeks to prevent the infiltration of runoff contaminated with non-point source pollution.

Deicing chemicals in runoff will not adversely impact groundwater quality and need not be specifically addressed. Erosion and sediment pollution control measures can be designed on a site-specific basis to maximize a condition that will promote the removal of dissolved species.



0 500 1,000 2,000
Feet

Legend

- Matchline
- Municipal / County Boundary
- Detention Basins

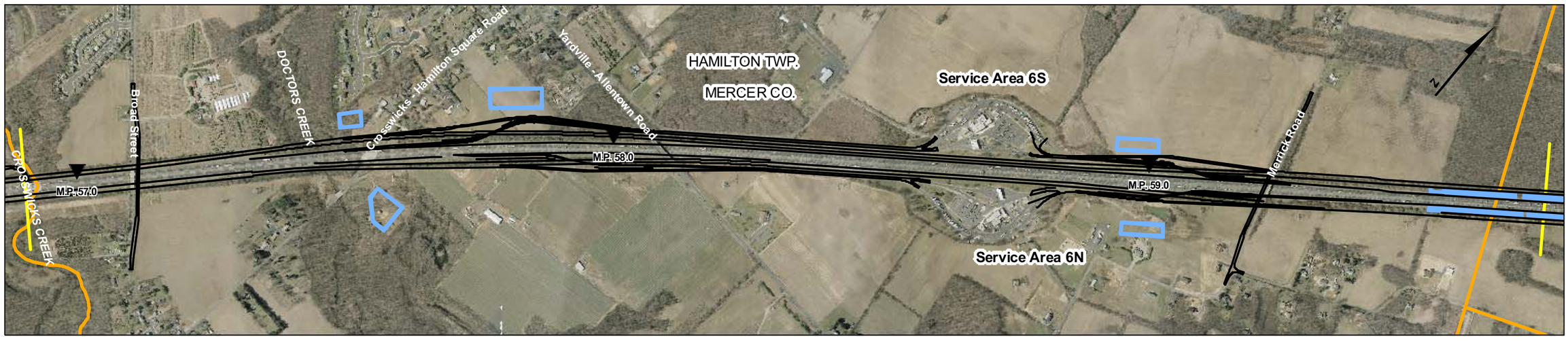
Source: Digital Orthophotos - 2006 Aerial Photography.

Proposed Stormwater Detention Basins

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
4-1a



0 500 1,000 2,000
Feet

Legend

- Matchline
- Municipal / County Boundary
- Detention Basins

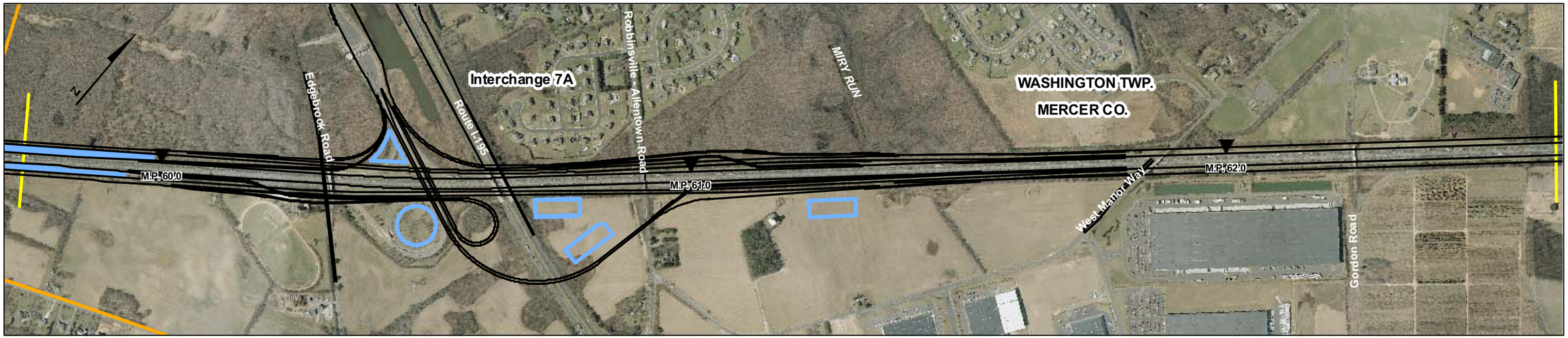
Source: Digital Orthophotos - 2006 Aerial Photography.

Proposed Stormwater Detention Basins

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
4-1b



0 500 1,000 2,000
Feet

Legend

- Matchline
- Municipal / County Boundary
- Detention Basins

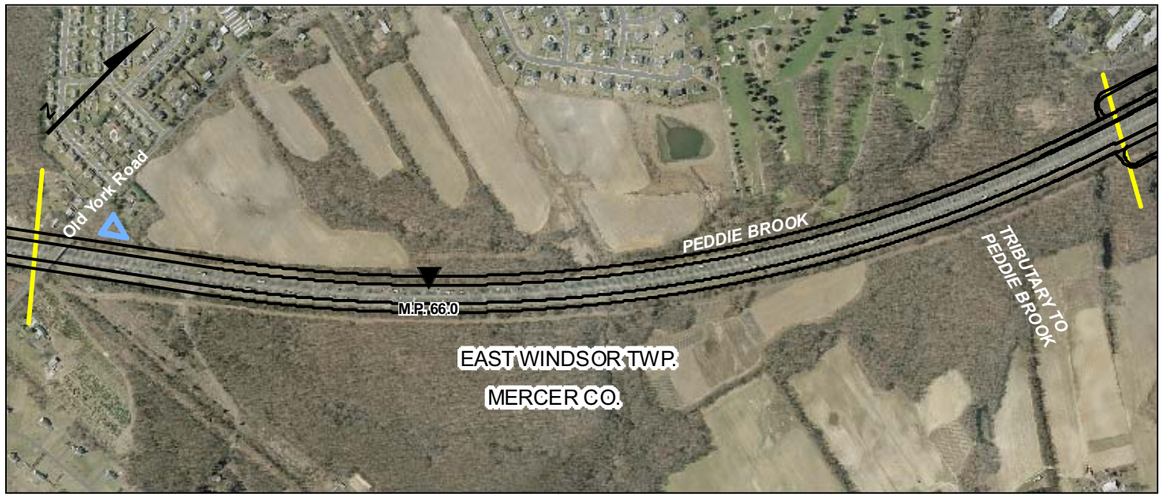
Source: Digital Orthophotos - 2006 Aerial Photography.

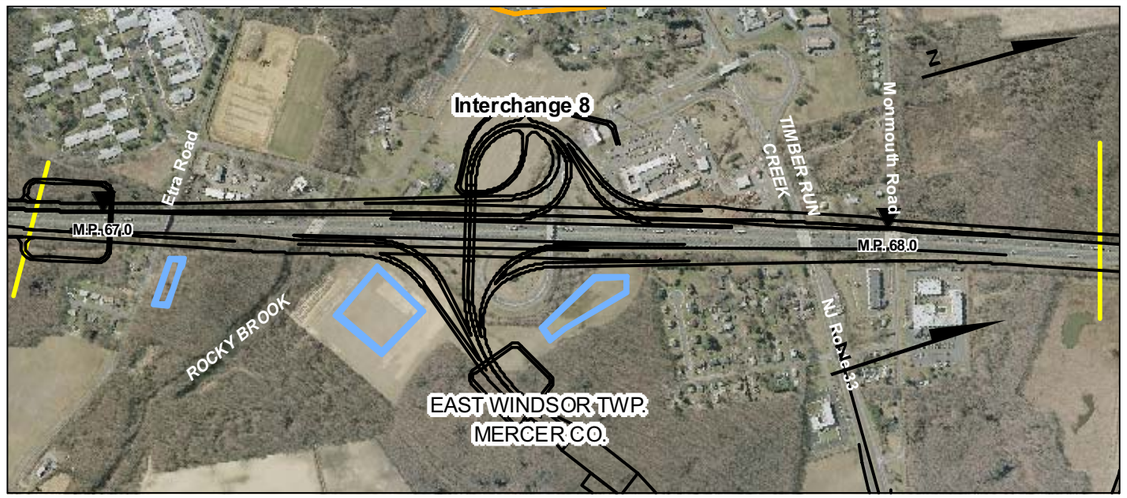
Proposed Stormwater Detention Basins

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
4-1c





Legend

- Matchline
- Municipal / County Boundary
- Detention Basins

0 500 1,000 2,000 Feet

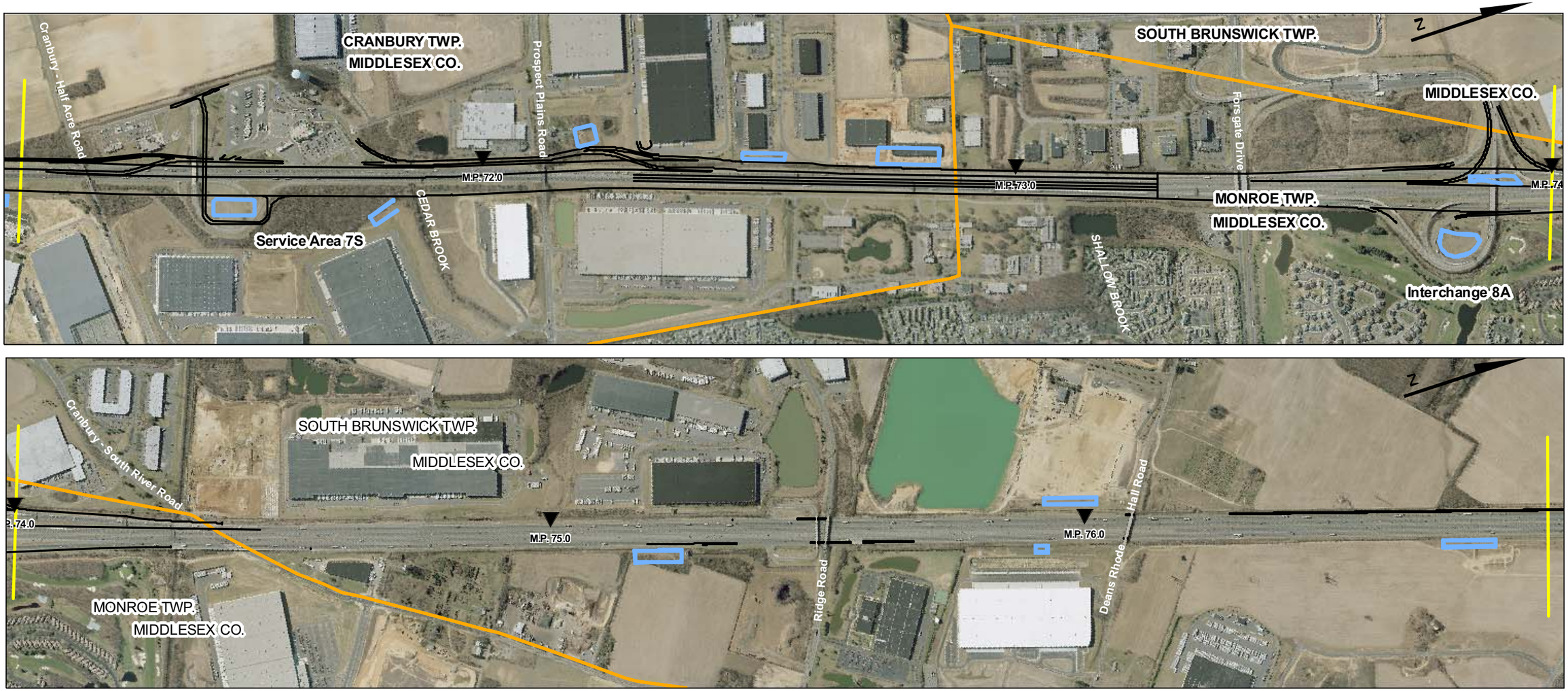
Source: Digital Orthophotos - 2006 Aerial Photography.

Proposed Stormwater Detention Basins

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 4-1d



0 500 1,000 2,000 Feet

Legend

- Matchline
- Municipal / County Boundary
- Detention Basins

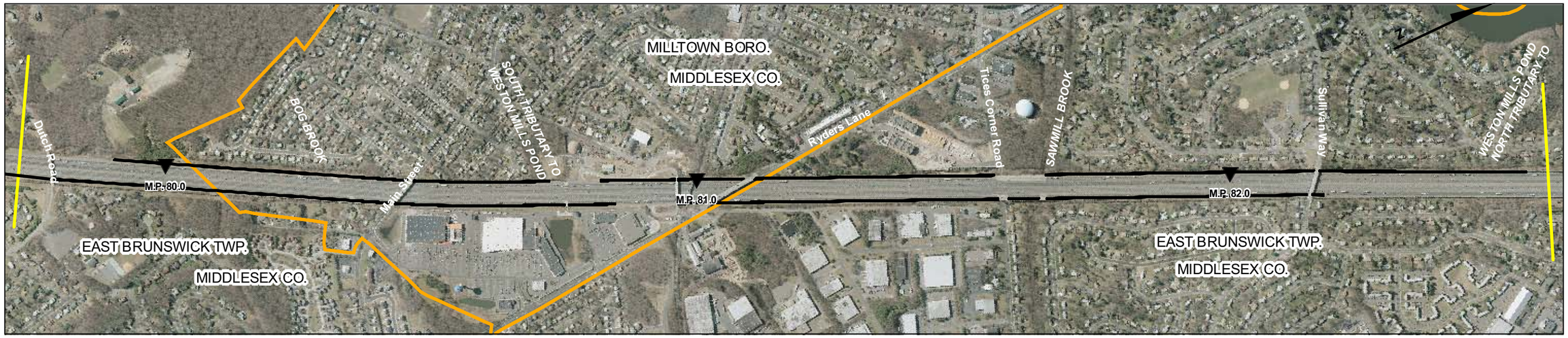
Source: Digital Orthophotos - 2006 Aerial Photography.

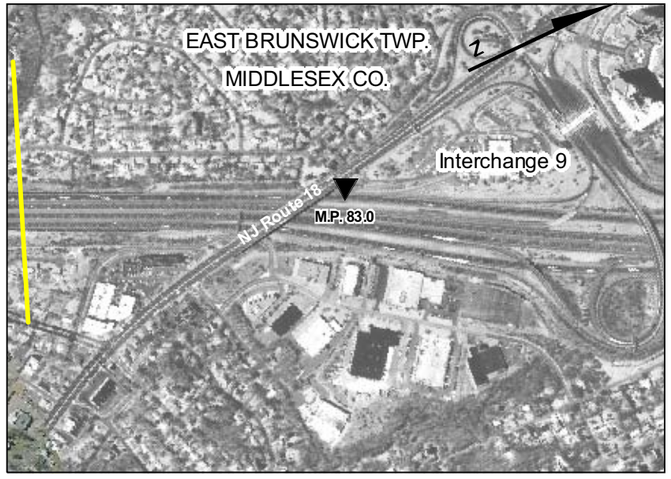
Proposed Stormwater Detention Basins

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
4-1e





Legend

- Matchline
- Municipal / County Boundary
- Detention Basins

0 500 1,000 2,000 Feet

Source: Digital Orthophotos - 2006 Aerial Photography.

Proposed Stormwater Detention Basins

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 4-1f

4.11.5.2 Mitigation of Operational Impacts

Surface Water

Impacts to surface water hydrology and water quality will be minimized through the use of Stormwater Best Management Practices (BMPs). In addition, NJDEP requires that major development that disturbs more than 1.0 acre of land or increasing impervious surface by 0.25 acre or more address surface water hydrology and water quality to the maximum extent practical through the implementation of the Stormwater Management (SWM) Rule (N.J.A.C. 7:8). An analysis of the Proposed Project has been performed to address the NJDEP requirements pertaining to the SWM Rules. The analysis was performed in accordance with the procedures outlined in the *New Jersey Stormwater BMP Manual*. Stormwater within each watershed will be treated as required before it is discharged to waterways. Where site constraints do not allow for treatment of stormwater generated directly from new or altered existing impervious surfaces, an equivalent volume of stormwater generated from existing impervious areas will be treated where conditions allow, such that within each watershed, the Proposed Project's stormwater impacts are mitigated. As a non-structural aspect of the SWM design, it is preferable for the existing drainage patterns to be maintained. The typical roadway pavement section for the new roadway will contain approximately 125 feet of additional pavement. The new median area between the inner and outer roadways will be paved and drained by cross-pipes to swales along the outside of the roadway. The outside roadway sections will drain via umbrella drainage into these swales. Every effort will be made in the design of the swales and BMPs to minimize the need for additional right-of-way. In areas where right-of-way is unavailable, where utility conflicts exist, or where there are environmental constraints, runoff will be conveyed through a closed storm sewer system in order to minimize adverse impacts to these areas.

In accordance with the SWM Rule pertaining to runoff quantity control, three alternatives are available for design, as follows:

- The post-construction hydrograph for the 2-year, 10-year, and 100-year storm events shall not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

- There shall be no increase, as compared to the pre-construction condition, in peak runoff rates of stormwater leaving the project site for the 2-year, 10-year, and 100-year storm events, and the increased volume or change in timing of stormwater runoff shall not increase flood damage at or downstream of the site.

- The post-construction peak runoff rates for the 2-year, 10-year, and 100-year storm events shall be 50 percent, 75 percent, and 80 percent, respectively, of the pre-construction rates.

Since the Proposed Project will result in the creation of new impervious areas, stormwater runoff rates will increase. A typical structural method to control the runoff rate and/or volume is to provide a detention/retention facility. The ideal locations for these facilities would be within the proposed interchange infields and maintenance U-turn infields. The locations of the detention/retention facilities will be selected such that adverse impacts on the environment or groundwater are avoided. At the basin locations, the water table depth should be checked. Prior to final design, the Authority will undertake a soil boring/groundwater monitoring well program to confirm existing boring log data and to ensure that all basins are properly designed.

In a number of areas within the Project Corridor, the groundwater table is relatively high. Boring logs from Turnpike "As-Built" drawings have been used to approximate the groundwater table at each proposed basin location and the basin locations and/or preliminary designs have been adjusted

accordingly. In accordance with the *New Jersey Stormwater BMP Manual*, all detention/retention facilities have been designed to keep the bottom of each facility (including sub-base materials and underdrains) a minimum of one foot above the seasonal high groundwater level. Therefore, in areas of high groundwater levels, detention facilities have been forced to remain shallow (minimum four feet deep), thus increasing the surface area necessary to handle the stormwater runoff. Other major constraints which have limited the locations and size of proposed detention/retention facilities included the presence of freshwater wetlands, floodplains, cultural resources, preserved farmlands, public open space and major utilities. In a February 7, 2006 Pre-Application meeting with NJDEP, these multiple environmental and socioeconomic constraints were discussed and it was recommended that a hardship waiver be requested in areas where the stormwater runoff quantity requirements may not be fully met.

Stormwater runoff will be conveyed by a series of proposed and existing inlets, manholes, swales and pipes to each of the individual watershed's detention facilities. Each detention facility would then discharge at or below the existing condition runoff rate, or volume, for the 2-year, 10-year and 100-year storms to the nearest water body, as required by the SWM Rule.

In accordance with the SWM Rule as it pertains to runoff quality, the Proposed Project must be designed to reduce the level of post-construction Total Suspended Solids (TSS). The TSS load must be reduced by 80 percent for new impervious areas, 50 percent for redeveloped existing impervious areas and 0 percent for unaltered existing areas, for the water quality design storm, which is a two-hour, 1.25-inch rainfall event. Additionally, any waters being conveyed to Assunpink Creek must be treated to 95 percent TSS removal due to the creek's designation as a Category One (C-1) water.

Typical BMPs to achieve the required TSS removal rates include the use of detention/retention basins, bio-retention systems, constructed stormwater wetlands and mechanical treatment devices. The water quality BMPs will be placed in series in accordance with the SWM Rule within each watershed in order to achieve the required TSS reduction for the Proposed Project. All existing and proposed impervious areas will be identified and weighted, such that the Proposed Project's drainage areas within each watershed will be treated as required, according to a calculated weighted TSS removal rate.

However, in some watersheds located in the Project Corridor, it may not be possible or feasible to capture all of the surface runoff and treat it to the required rate due to various site constraints and topography. These site constraints may also limit the size of a proposed detention facility in certain watersheds, thus restraining its ability to achieve the NJDEP's performance rating for a full 60 percent TSS reduction for an extended detention basin, as allowed by the *Stormwater BMP Manual*. NJDEP has recommended the use of mechanical stormwater treatment devices in order to achieve the required TSS removal rate in lieu of multiple larger-sized detention facilities.

Individual sub-areas throughout the Project Corridor each have their own unique circumstances that will dictate their corresponding alternative SWM design method and TSS removal options. Each sub-area is compromised of an area located between two high points along the roadway and the corresponding stream watersheds within these areas. Site variables such as existing topography, current drainage patterns, high groundwater tables, and the presence of freshwater wetlands, preserved farmlands, utilities and other environmental/socioeconomic constraints will directly influence the proposed drainage systems. In addition, special care needs to be taken to ensure that the proposed facilities are located within the existing right-of-way to the maximum extent practical. In addition, throughout the Project Corridor, major underground and aboveground utilities run in close proximity and parallel to the existing Turnpike. The excessive cost associated with relocating these utilities becomes the leading factor in locating stormwater and drainage facilities outside of the existing right-of-way.

A few key elements are common to each watershed that will be affected within the Project Corridor. Drainage swales will be located on the outside of the proposed roadway sections to convey stormwater runoff to either a detention facility or to a waterway. Within each watershed, at least one detention facility and manufactured treatment device will be necessary in order to meet the requirements of the SWM Rule.

Groundwater

The operation and maintenance of the Municipal Separate Storm Sewer Systems (MS4) along the Turnpike is currently governed by a Highway Agency Stormwater General Permit (NJPDES General Permit No. NJ0141887) issued by NJDEP to the Authority. Among the most important design and performance standards stipulated in the permit are the maintenance requirements in N.J.A.C. 7:8-5.8. These standards contain specific preventative maintenance tasks and schedules, documentation and recordkeeping guidelines, and identifies persons responsible for BMP preventative and corrective maintenance (including replacement). The long-term maintenance and performance monitoring of the new BMPs designed to encourage groundwater recharge will be incorporated into a maintenance plan for the stormwater management measures used to mitigate the water resource impacts of this project. With proper maintenance and performance monitoring of the BMPs, groundwater recharge or contamination will be avoided during the continued operation of the roadway. The formulation of a comprehensive maintenance plan for stormwater facilities will be coordinated with the Authority's Maintenance Department to ensure the implementation of a timely and effective maintenance program that meets NJDEP regulatory standards.

Deicing chemicals in runoff will not adversely impact groundwater quality and will not need to be specifically addressed. Swales can be designed on a site-specific basis to maximize a condition that will promote the removal of dissolved chemicals.

4.11.6 Summary

Compliance with the state's stormwater management regulations will require the use of non-structural and structural stormwater management measures such as swales, bio-retention and detention basins, and manufactured treatment devices throughout the Project Corridor.

4.12 Floodplains

4.12.1 Introduction

In many cases within the Project Corridor, the land along streams and rivers that would normally be occupied by floodwaters during a flood has been filled in by development, thereby forcing floodwaters to go elsewhere during storm events. It has been proven historically, and can be demonstrated mathematically, that this displacement of natural flood storage volume increases the depth and velocity of flooding and expands the areas subject to flooding. Greater flooding leads to greater public safety hazards as well as increased loss of property. Furthermore, higher flood flows in channels increase the potential for erosion, stream bank failure and sediment deposition, which adversely impacts fishery resources and other aquatic life. The importance of protecting the existing floodplain is vital to minimizing damages upstream and downstream due to increased flood heights, increased flow and loss of storage.

4.12.2 Data Sources and Methodology

For the purposes of this EIS, only streams to be crossed by the Proposed Project having a contributing drainage area greater than 50 acres and having an existing structure greater than a 4-foot diameter culvert were selected to be analyzed. These criteria have been chosen to coincide with NJDEP's *Flood Hazard Area Regulation* (7:13-2.1), which establishes the engineering requirements under the Flood Hazard Area Regulations. During the final design phase of the Proposed Project, the remaining streams will need to be analyzed to ensure the design's compliance with NJDEP's regulations (7:13). Standard computational methods for determining the design discharges and flood hazard areas are outlined in NJDEP's *Technical Manual for Stream Encroachment* dated July 1988.

A preliminary study of the existing and proposed hydrologic and hydraulic conditions was performed for twelve of the Turnpike's 28 stream crossings. Circular pipe culverts with a diameter of 48 inches or less were selected to be omitted from the hydrologic and hydraulic analysis, but these pipes should be addressed in the Proposed Project's final design stage. The studies for the remaining structures were conducted to determine the contributing drainage area, 100-year peak discharge and the 100-year water surface elevation. The data utilized were determined from either available published studies or calculated using accepted hydrologic and hydraulic methodologies. A more detailed hydrologic and hydraulic study for each structure is recommended during final design.

As discussed previously in Section 3.13.3, the Flood Hazard Area mappings and hydraulic models for some of these watercourses were available and were obtained from NJDEP's Bureau of Floodplain Management. The hydraulic models were then imported into the *HEC-RAS 3.1.3* computer program developed by the U.S. Army Corps of Engineers.

Hydraulic analysis for the remaining streams was prepared using the HY8 computer program developed by the Pennsylvania State University in cooperation with the Federal Highway Administration (FHWA). Analyses of the existing and proposed conditions for each structure were conducted for the 100-year flood and then the results were reviewed and compared.

4.12.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. The existing floodplains would remain undisturbed and, therefore, no floodplain-related impacts would result to the Project Corridor.

4.12.4 Proposed Project Impacts

Table 4.23 indicates which of the 28 waterway crossings within the Project Corridor have had preliminary hydraulic analysis conducted specifically for the Proposed Project. The table also illustrates which structures within the Project Corridor need to be widened and if the structure opening or existing channel would require modification as a result of the Proposed Project. These impacts are specifically discussed in the separate sub-sections below.

4.12.4.1 Construction Impacts

As indicated in Table 4.23, the majority of the structures at the existing stream crossings will have to be extended to accommodate the Proposed Project. The structure over Assiscunk Creek will not have to be widened because no widening of the Turnpike is proposed at this location, and the structure over Shallow Brook has sufficient width to allow for the proposed highway widening. Structures located

Table 4.23
Project Area Stream Crossings

Stream Name	Mile Post	Active Channel Width	Type of Crossing Structure	Preliminary Hydraulic Analysis	Structure Widening	Opening/Channel Modification
Assiscunk Creek	48.2	25’	60-foot bridge span	No[1]	No	None
Crafts Creek	49.7	20’	30-foot bridge span	Yes	Yes	None
Tributary to Crafts Creek	50.3	7’	4-foot culvert	No[2]	Yes	N/A
Crystal Lake Creek	51.8	20’	14’ box culvert	Yes	Yes	None
Blacks Creek	53.4	20-25’	Two 20-foot arches	Yes	Yes	None
Laurel Run	53.9	15’	Three 4-foot round culverts	No[2]	Yes	N/A
Thorton Creek	55.3	4’	Culvert	No[2]	Yes	N/A
Crosswicks Creek	56.9	40’	Pier-supported bridge span	Yes	Yes	None
Doctors Creek	57.5	20’	Three 15-foot arches	Yes	Yes	None
Miry Run	61.9	3’	Culvert	No[2]	Yes	N/A
Assunpink Creek	63.3	30’	30 foot box culvert	Yes	Yes	None
Bear Brook	64.9	4’	Culvert	No[2]	Yes	N/A
Peddie Brook	66.2	5-18’	20-foot winged box culvert	Yes	Yes	Opening
Tributary of Peddie Brook	66.9	4’	Culvert	No[2]	Yes	N/A
Rocky Brook	67.3	20’	Pier-supported bridge span	Yes	Yes	Channel
Timber Run Creek	67.9	10-12’	4 foot culvert	No[2]	Yes	N/A
Millstone River	68.8	25’	30 foot wide tunnel	Yes	Yes	Channel
Indian Run Brook	69.5	5-15’	10-foot box culvert	Yes	Yes	Opening
Cranbury Brook	70.7	25’	25 foot tunnel	Yes	Yes	Opening
Cedar Brook	71.9	15-20’	16 foot box culvert	Yes	Yes	Opening
Shallow Brook	72.9	4’	Culvert	No[3]	No	N/A
Ireland Brook	77.8	10-18’	16 foot box culvert	No[4]	No	N/A
South Branch of Beaverdam Brook	79.2	5’	Bridged-over culvert	No[4]	No	N/A
North Branch of Beaverdam Brook	79.4	8’	Bridged-over culvert	No[4]	No	N/A
Bog Brook	80.3	4’	Bridged-over culvert	No[4]	No	N/A
South Tributary to Weston Mills Pond	80.7	4’	Bridged-over culvert	No[4]	No	N/A
Sawmill Brook	81.6	12’	Bridged-over 10’ box culvert	No[4]	No	N/A
North Tributary to Weston Mills Pond	82.5	4’	Culvert	No[4]	No	N/A

Notes: [1]The structure over Assiscunk Creek is within the Project Corridor, although no widening is proposed at that location.
[2]Structure has a drainage area less than 50 Acres or is a 48” or less culvert pipe. A more detailed analysis will be required during final design.
[3]The structure over Shallow Brook is wide enough to allow for the proposed widening.
[4]The structures from milepost 72.9 to milepost 82.5 lie between Interchanges 8A and 9 where no widening is proposed.

north of M.P. 72.9 lie between Interchanges 8A and 9 where no physical widening of any waterway crossing structures is proposed.

Construction of the Proposed Project will impact the surrounding floodplain by temporarily restricting the floodway and reducing the storage capacity of the floodplain. Restricting the floodway may increase the flow in the channel and cause erosion. In addition, the reduction in the floodplain's storage capacity may affect the safety of the surrounding area. The channel for the structures over Rocky Brook and the Millstone River will have to be modified, which will have a direct impact on the associated floodway and floodplain.

4.12.4.2 Operational Impacts

After construction, the 100-year water surface elevation of streams in the Project Corridor will comply with the applicable NJDEP and Flood Hazard Area Control Act Rules (N.J.A.C. 7:13) criteria and therefore will not create significant adverse impacts to the surrounding floodplain.

As indicated in Table 4.23, most structures at the existing stream crossings will have to be extended to accommodate the widened Turnpike. The proposed widening or replacement of these structures will have to meet the bridge and culvert design requirements of the Flood Hazard Control Act (N.J.A.C. 7:13-2.16). Although it is inevitable that a loss of effective floodplain storage volume will occur due to the placement of roadway embankment material within the 100-year floodplain, it is anticipated that compliance with NJDEP's Bureau of Floodplain Management's net fill requirements (N.J.A.C. 7:13-2.14) can be met. Significant adverse impacts to existing stream hydraulics are not anticipated as a result of the Proposed Project.

4.12.5 Mitigation of Impacts

Procedures will have to be considered prior to construction on how to maintain floodplain storage during construction. Design considerations will have to address channel widening in order to maintain existing hydraulic conditions so that there is no impact to the upstream or downstream community. Analysis of the construction phase of the project is recommended to ensure that impacts during construction are kept to a minimum.

In the design of the Proposed Project, construction within floodplains, and the placement of fill material will be minimized as much as possible. Each proposed widening of an existing stream crossing will reduce the available floodplain storage or may have a percentage of the net fill exceeding 20 percent. To mitigate this loss of floodplain storage volume, the following measures should be considered.

- The proposed widening or replacement of a waterway crossing should result in no increase in the 100-year surface elevation while minimizing fill in the flood fringe area.

- Areas adjacent to each floodplain crossing could be excavated to produce a greater available storage volume, which could mitigate storage losses due to fill.

- Excess areas associated with each floodplain could be acquired and set aside as a perpetual drainage area. Enough area could be acquired to reduce the net fill volume to the maximum 20 percent allowable.

4.12.6 Summary

Floodplain crossings cannot be avoided by the Proposed Project. The proposed widening of the various stream crossings should be designed to minimize impacts to the floodplain, thereby reducing the effects on the natural and beneficial floodplain values such as fish, wildlife, vegetation, recreational use, flood storage, water quality maintenance, and groundwater recharge.

Significant adverse impacts to existing stream hydraulics are not anticipated to result from the Proposed Project in the corridor. Compliance with applicable NJDEP criteria will result in no increase in the 100-year surface water elevation. Disturbed floodplain areas would be stabilized during and after construction. As a result, the Proposed Project is not anticipated to result in significant adverse impacts to upstream or downstream communities.

4.13 Ecology

4.13.1 Introduction

After the field review of the Project Corridor was completed to document the extent of existing aquatic and vegetative communities, regulated wetlands/watercourses and wildlife habitats, an impact analysis was conducted to identify potential impacts to these biologic/natural resources.

4.13.2 Data Sources and Methodology

The impact analysis presented below includes five areas of analysis: aquatic communities; vegetative habitats; regulated wetlands; wildlife; and threatened and endangered species. Potential impacts to each of these areas were assessed by overlaying the proposed alignment onto 2006 aerial photography and then identifying impacts, as described below.

The methodology used to identify potential aquatic community impacts consisted of overlaying the proposed alignment on aerial photography with the wetland/water course boundaries defined and then calculating the area of aquatic impact expected to result from the Proposed Project.

The methodology used to identify potential upland vegetation impacts consisted of overlaying the proposed alignment on aerial photography with vegetative communities defined and then calculating the area of impact for each vegetative community.

Similar to aquatic and upland vegetation, the methodology used to identify potential wetland impacts consisted of overlaying the proposed alignment onto the delineated wetland mapping and calculating the area of impact for each wetland community type.

The methodology used to identify potential wildlife impacts consisted of overlaying the proposed alignment onto aerial photography with vegetative communities defined and calculating the area of impact for each vegetative community associated. The impacted vegetative communities with known habitat for certain species of wildlife were then identified, and wildlife species that utilize that habitat were listed.

The methodology used to identify potential impacts to threatened and endangered species consisted of overlaying the proposed alignment onto the NJDEP *Landscape GIS* Version 2.0 database for threatened and endangered species and calculating the area of impact to habitat for each threatened and endangered species.

4.13.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no direct or indirect impact to aquatic and vegetative communities, regulated wetlands/watercourses and wildlife habitats.

4.13.4 Proposed Project Impacts

4.13.4.1 Aquatic Communities

Construction Impacts

The major impact to aquatic communities from the Proposed Project will result from erosion of soils which are exposed during construction activities. Twenty-eight streams cross under the Turnpike in the Project Corridor, ranging from intermittent runs flowing through concrete culverts, to creeks and rivers up to 40 feet in width. Most of these streams receive Turnpike runoff directly through ditches located at the base of the highway embankment. The deposition of sediment into these already-impacted streams could be significant unless mitigated. Larger streams in the Project Corridor (e.g., Assiscunk Creek, Crafts Creek, etc.) have high flow rates and can transport considerable amounts of sediment. However, a number of the streams in the corridor are small and are characterized by low or intermittent flow rates and, therefore, have less ability to transport sediment. These small streams are subject to extreme flows associated with stormwater runoff. The existing water quality, general stream appearance, and aquatic biota downstream of the Turnpike reflect these extremes of stream flow. The stream assessments conducted in the Project Corridor characterized the stream water quality as good to poor, with pollution problems of the type usually associated with highway runoff and stormwater runoff from agriculture, construction sites, and suburban areas (see Section 3.14.3).

Increased sedimentation in Project Corridor streams as a result of erosion during construction could adversely affect aquatic biota in areas immediately downstream of the Turnpike, particularly in small streams. Adult fish and mobile macroinvertebrates (such as crayfish) can avoid conditions of high turbidity and sediment deposition; however, this may cause temporary shifts in trophic structure. Increases in suspended sediment can cause fish gills to become clogged, resulting in respiratory impairment. Increases in turbidity can also reduce the foraging ability of aquatic biota which depend on sight or light to feed. Less mobile or immobile organisms or life stages (eggs, larvae, and juveniles) may experience reduced survival or burial as a result of turbidity and sedimentation increases. In addition to the physiological stresses associated with increased sedimentation, aquatic biota would also be subjected to a significantly increased chemical oxygen demand due to the presence of oxidizable components in the sediment entering streams.

The clearing of riparian vegetation during construction will result in the loss of natural stream canopy cover and shade. Stream shading is important to maintain cool water temperature and limit excessive growth of submerged macrophytes and algae. The loss of this shade will reduce habitat quality for fish and aquatic invertebrates until vegetation becomes reestablished. The addition of stabilization measures (i.e., riprap, gabion) along stream banks around crossing structures will permanently alter the natural stream substrate and flow rates, which may also reduce habitat quality for some stream biota. However, the existing crossing structures have already altered shading and natural stream substrate and embankments for the majority of the streams in the Project Corridor.

Most of the stream crossing structures will be widened by extending the existing structure, as indicated previously in Table 4.23. As the culverts and arched crossings and some bridge piers are located within the stream channel or associated wetland, extending these structures will require in-water work. Some

of the culverts may be bridged over in order to avoid impacts to special status species habitat, exceptional value wetlands (i.e., Laurel Run) or because of engineering constraints. Table 4.24 presents the stream crossings in the Project Corridor and the proposed widening method and associated impacts to aquatic biota for each.

No widening of stream crossing structures would take place between Interchange 8A and Interchange 9. These streams include Ireland Brook, the South Branch of Beaverdam Brook, the North Branch of Beaverdam Brook, Bog Brook, the South Tributary to Weston Mills Pond, Sawmill Brook, and the North Tributary to Weston Mills Pond. Construction activity in this segment of the Project Corridor would be limited to the paving of the shoulder built during the 1985-1990 widening program. Sediment input into these streams during construction is expected to be negligible. Subsequent use of this segment would result in slight increases in runoff volume and associated contaminants; however, aquatic biota are not expected to be adversely impacted.

The streams crossing the Turnpike in the Project Corridor are already impacted by stormwater runoff and adjacent land uses (utility right-of-ways, agriculture, and other development). Because of this, the fish and benthic species present in these streams are tolerant of variable flow rates and periodic turbidity increases typically encountered throughout the year.

Construction impacts to aquatic communities are expected to be short-term. When mitigated with erosion and sediment control practices, construction impacts are not expected to be significant. However, permanent shading of approximately 9.08 acres of open water will occur through construction of bridges spanning these streams. Through this shading, aquatic communities will experience some reduction in photosynthesis for plant life, and cooler water temperatures.

Operational Impacts

Streams in the Project Corridor receive substantial volumes of runoff from the Turnpike. This runoff contains a variety of contaminants (petroleum hydrocarbons, metals, etc.) which can adversely affect aquatic biota. However, these streams have been receiving contaminants in runoff from the Turnpike for decades. Increasing the width of the Turnpike will result in increased volumes of runoff entering these streams. Initially, the water quality of runoff entering streams would be improved, as existing levels of contaminants are diluted in greater volumes of runoff, but over time as the number of vehicles on the Turnpike increases, the concentrations of contaminants will approach pre-widening levels.

An increase in the road's surface area would require proportional increases in the amount of deicing salts used during the winter, which ultimately enter streams in the Project Corridor. Salt concentrations in receiving streams will be highest for the smaller and intermittent streams which have less water volume with which to dilute salt. Salt can have direct effects on aquatic biota and aquatic community structure. However, an increase in the volume of deicing salt used would be accompanied by a proportional increase in snow/ice volume, so overall concentrations of salt in stream waters are not expected to increase. Aquatic biota downstream of the Turnpike will experience additional osmoregulatory stress following periods of salt use, but these water quality conditions already exist. The fish and benthic species which inhabit these streams are hardy, opportunistic species tolerant of these water quality conditions.

With the increase of impervious surfaces through construction of the additional roadways, an increase in runoff volumes will occur to roadside ditches and downstream water courses. This increase in stormwater could create additional scouring in small streams that do not have adequate stream storage.

Table 4.24
Proposed Stream Crossing Widening Methods
and Associated Impacts to Aquatic Biota

Stream Name	Proposed Widening Method	In-Water Work Required	Construction Impacts	
			Fish	Benthos
Assiscunk Creek	Widen existing bridge	No	--	--
Crafts Creek	Widen existing bridge	Yes	--	--
Tributary to Crafts Creek	Widen existing culvert	Yes	T	S
Crystal Lake Creek	Widen existing culvert	Yes	T	S
Blacks Creek	Widen existing arched structure	Yes	T	S
Laurel Run	Bridge over existing culverts	Yes	--	--
Thorton Creek	Widen existing culvert	Yes	T	S
Crosswicks Creek	Widen existing bridge	Yes	T	S
Doctors Creek	Widen existing arched structure	Yes	T	S
Miry Run	Widen existing culvert	Yes	T	S
Assunpink Creek	Widen existing culvert	Yes	T	S
Bear Brook	Widen existing culvert	Yes	T	S
Peddie Brook	Widen existing culvert	Yes	T	S
Tributary of Peddie Brook	Widen existing culvert	Yes	T	S
Rocky Brook	Widen existing bridge	Yes	T	S
Timber Run Creek	Widen existing culvert	Yes	T	S
Millstone River	Widen existing bridge	Yes	T	S
Indian Run Brook	Widen existing culvert	Yes	T	S
Cranbury Brook	Widen existing bridge	Yes	T	S
Cedar Brook	Widen existing culvert	Yes	T	S
Shallow Brook	Widen existing culvert	No	T	S
Ireland Brook	None	--	--	--
South Branch of Beaverdam Brook	None	--	--	--
North Branch of Beaverdam Brook	None	--	--	--
Bog Brook	None	--	--	--
South Tributary to Weston Mills Pond	None	--	--	--
Sawmill Brook	None	--	--	--
North Tributary to Weston Mills Pond	None	--	--	--

Legend: S = Shift in species composition and/or abundances
T = Temporary avoidance of area
-- = Not applicable

The new NJDEP stormwater regulations require 80 percent treatment of waters from new pavement and 50 percent treatment of newly captured runoff. This treatment includes: total suspended solids removal for water quality improvement; ground water recharge to local aquifers; and water quantity reduction rate to slow water and prevent erosion. With these new NJDEP stormwater regulations, treatment facilities will be required along the Turnpike where none currently exit to reduce water quality/quantity impacts associated with the project.

Operational impacts to aquatic communities anticipated to result from the Proposed Project are not expected to be significant.

4.13.4.2 Upland Vegetative Habitats

Construction Impacts

The major impact to upland vegetation in the Project Corridor is associated with clearing the right-of-way and surcharging above existing vegetation on embankments. Upland vegetation will be destroyed directly by construction activities; however, long-term impacts will be minimal because the proposed fill or cut slopes will be revegetated with mowed turf. Other impacts to vegetation are uncontrolled surface water runoff that can destroy vegetation directly by eroding the soil away from the roots and ultimately washing the plants away. In other cases, eroded material will build up around the base of vegetation and can "smother" it. The removal of vegetation during construction will create barren areas in certain locations. If these areas are on a slope, erosion can occur and the resultant substrate will often be unsuitable for plant growth.

Impacts to upland vegetation are discussed below according to the individual segments of the Project Corridor that were previously described in Section 3.14.4 of this report. A summary table of acquisitions is presented in Table 4.25. For the following discussion, active agricultural lands are defined as farmlands in crop or that have been fallow for less than three years.

Assiscunk Creek to Interchange 6

In this segment of the Project Corridor, approximately 7.51 acres of mowed turf, 15.60 acres of agricultural land, 1.10 acres of scrub-shrub, 15.01 acres of young forest and 5.56 acres of mature forest would potentially be lost due to construction.

Of the 44.78 acres of total upland vegetation impact, approximately 14.09 acres are attributable to stormwater detention basins required to meet the state's new stormwater regulations. Of the six detention basins proposed in this segment of the Project Corridor, three are proposed in agricultural lands (10.20 acres), two in mowed turf (3.48 acres) and one in a mature forest (0.41 acres).

Interchange 6 to Interchange 7

In this segment of the Project Corridor, approximately 11.73 acres of mowed turf, 6.10 acres of agricultural land, 3.14 acres of scrub-shrub, 22.73 acres of young forest and 5.90 acres of mature forest would potentially be lost due to construction.

Of the 49.60 acres of total upland vegetation impact, approximately 12.87 acres are attributable to stormwater detention basins. Of the five detention basins proposed in this segment, three are proposed in agricultural lands (7.08 acres) and two in mature forest (5.79 acres).

Table 4.25
Upland Vegetation Impacts

Cut or Fill Impacts (Acres)						
Turnpike Section	**MT**	**AG**	**SS**	**YF**	**MF**	**Total**
Assiscunk Creek to Int. 6	7.51	15.60	1.10	15.01	5.56	**44.78**
Int. 6 to Int. 7	11.73	6.10	3.14	22.73	5.90	**49.60**
Int. 7 to Int. 7A	33.78	67.53	2.93	29.72	14.19	**148.15**
Int. 7A to Int. 8	31.18	52.56	18.49	30.69	16.66	**149.58**
Relocated Int. 8	9.97	24.18	0.85	7.02	14.49	**56.51**
Int. 8 to Int. 8A	23.59	11.58	12.74	2.24	17.95	**68.10**
Int. 8 to Int. 9	2.24	2.19	0.0	1.85	0.0	**6.28**
Total	**177.76**	**177.55**	**39.25**	**107.41**	**74.75**	**516.72**

Legend: MT: Mowed Turf
AG: Agricultural Land
SS: Scrub-Shrub
YF: Young Forest
MF: Mature Forest

Source: The Louis Berger Group, Inc. /Dewberry-Goodkind, Inc., 2006.

Interchange 7 to Interchange 7A

In this segment of the Project Corridor, approximately 33.78 acres of mowed turf, 67.53 acres of agricultural land, 2.93 acres of scrub-shrub, 29.72 acres of young forest and 14.19 acres of mature forest would potentially be lost due to construction.

Of the 148.15 acres of total upland vegetation impact, approximately 38.62 acres are attributable to stormwater detention basins. Of the 12 detention basins proposed in this segment, five are proposed in agricultural lands (17.99 acres), three are in mowed turf (9.43 acres), and four are in mature forest (11.20 acres).

Interchange 7A to Interchange 8

In this segment of the corridor, approximately 31.18 acres of mowed turf, 52.56 acres of agricultural land, 18.49 acres of scrub-shrub, 30.69 acres of young forest and 16.66 acres of mature forest would potentially be lost due to construction.

Of the 149.58 acres of total upland vegetation impact, approximately 33.41 acres are attributable to stormwater detention basins. Of the five detention basins proposed in this segment, two are proposed in agricultural lands (15.29 acres) and three are in mature forest (18.12 acres).

The Area Around Relocated Interchange 8

In this area, approximately 9.97 acres of mowed turf, 24.18 acres of agricultural land, 0.85 acres of scrub-shrub, 7.02 acres of young forest and 14.49 acres of mature forest would potentially be lost due to construction.

Of the 56.51 acres of total upland vegetation impact, approximately 3.28 acres are attributable to stormwater detention basins. Two basins are proposed in this area, and both are in mature forest.

Interchange 8 to Interchange 8A

In this segment of the Project Corridor, approximately 23.59 acres of mowed turf, 11.58 acres of agricultural land, 12.74 acres of scrub-shrub, 2.24 acres of young forest and 17.95 acres of mature forest would potentially be lost due to construction.

Of the 68.10 acres of total upland vegetation impact, approximately 20.02 acres are attributable to stormwater detention basins. Of the six detention basins proposed in this segment, two are proposed in agricultural lands (8.15 acres), one in mowed turf (1.55 acres) and two are in mature forest (10.22 acres).

Interchange 8A to Interchange 9

In this segment of the Project Corridor, approximately 2.24 acres of mowed turf, 2.19 acres of agricultural land and 1.85 acres of young forest would potentially be lost due to construction.

In addition to the 6.28 acres of total upland vegetation impact described in the preceding paragraph, approximately 9.90 acres are attributable to stormwater detention basins. Because these basins are proposed to be located outside the limits of the vegetation fieldwork, no breakdown according to vegetation type is available.

Operational Impacts

Deicing chemicals, particularly sodium chloride and calcium chloride, often enter the soil, plants, and stems in proximity of a roadway. The most obvious effect on sensitive vegetation is chronic toxicity and the burning and browning of foliage. Salt interferes with the photosynthetic and respiratory processes. Small quantities of salts absorbed through roots or exposed vegetation can produce discoloration of leaves and possibly early leaf fall. Acute dosages will kill leaves directly and possibly the entire plant. The vegetation planted on the new slopes will be resistant to salt damage.

The upland and wetland vegetation remaining adjacent to the widened roadway may experience impacts due to increases in runoff and contaminants associated with highway runoff.

Reforestation Act

Pursuant to the so-called No Net Loss Reforestation Act, N.J.S.A. 131L-14.1 to 14.4, a state entity must prepare a reforestation plan for areas at least one-half acre in size that are scheduled for deforestation. The reforestation plan is subject to review, public comment and DEP approval before deforestation may take place. The estimated loss of forested land within the Project Corridor is 400 acres. A Reforestation Plan will be finalized upon completion of final design to address this requirement.

4.13.4.3 Regulated Wetlands

Construction Impacts

Construction impacts to wetlands/watercourses will result from either filling to increase the elevation of the area forming the highway base or from cutting where the existing elevation is too high. A majority of the wetlands encountered by the Proposed Project will experience filling. However, the small roadside drainage ditches that run parallel to the Turnpike will be replaced with new drainage ditches within the Turnpike right-of-way. Wetland vegetation within these ditches will, over time, reestablish itself.

There was no calculation for transition area impacts, as the wetland resource value for each will need to be identified by NJDEP to identify the amount of transition area around each wetland. NJDEP identifies a wetland's resource value during the permitting or Letter of Interpretation (LOI) process.

Surface water movement and depth in wetlands are frequently significant contributors to the character of a wetland ecosystem. Environmental factors, such as nutrient and dissolved oxygen distribution and concentration at any one location, the period and extent of inundation, and the seasonal timing of high water, may all determine the distribution, abundance, and overall presence of plant species. In most cases, the proposed culverts and bridges will have the same internal dimension as existing structures and, as such, should not change the water regime and circulation pattern of the wetlands.

Bridge structures can reduce the direct loss of wetlands, in comparison to filling. However, shading can indirectly eliminate existing vegetation, although wetland functions such as flood storage and groundwater recharge can still be maintained. The loss of vegetation will negatively affect some wetland functions such as sediment trapping, nutrient retention, shoreline anchoring, and food-chain support.

All the streams that cross the Turnpike in the Project Corridor are bridged, in box culverts or small pipe culverts. The Proposed Project will either extend bridges or culverts, or bridge areas at existing culvert ends to avoid impacts to special status species habitat, exceptional value wetlands or open waters. Because the existing stream habitats are already experiencing the impacts that culverts can have on stream hydrology, no radical changes in stream hydrology that would affect wetlands are anticipated to occur.

Many of the lowland forested wetlands lack inlets or outlets because the Turnpike and the municipal roads that cross the Turnpike contribute stormwater to the forested wetlands and act as berms to natural drainage. Because the hydrology of these forested wetlands will not be altered by the Proposed Project and because land acquisition in them will occur only along the periphery closest to the Turnpike, no changes in the wetland functional value ratings are anticipated for the portions of the forested wetlands that are not acquired. Acquisitions that divide wetlands into smaller wetlands are undesirable and have been avoided by the Proposed Project. All the acquisitions within the Project Corridor will occur on the periphery of the wetlands, except in the case of the few isolated palustrine emergent wetlands and roadside ditches/swales that will be acquired in their entirety. No wetland will be divided into several smaller tracts. The total wetlands to be acquired are estimated to be approximately 113.85 acres.

Buffers surrounding regulated wetlands in New Jersey are called transition areas. These wetland transition areas are determined by the wetland resource value classification, as set by NJDEP. These 'buffers' extend around the wetland perimeter to ensure that a proposed development does not impact the wetland functions, such as habitat and flood control. The three resource value classifications are:

1. Exceptional wetlands – include sites with documented habitat or presence of threatened or endangered species; or discharges to trout production waters; and requires a 150-foot transition area buffer.
2. Intermediate wetlands – wetlands that are not extraordinary or ordinary, and require a 50-foot transition area buffer.
3. Ordinary wetlands – include altered drainage features such as ditches, swales, and detention basins; and do not require a transition area buffer. This category also includes isolated wetlands near developed areas.

Impacts associated with these transition areas have not been quantified in this document because the resource value of the wetland has not yet been determined by NJDEP. A request for LOI is currently being reviewed by NJDEP for the Project Corridor; the LOI will identify each wetland's resource value.

Impacts to wetlands are discussed below according to the individual segments of the Project Corridor that were previously described in Section 3.14.4 of this report. A summary table of acquisitions is presented in Table 4.26.

Assiscunk Creek to Interchange 6

In this segment of the Project Corridor, approximately 2.45 acres of roadside ditch, 0.61 acres of palustrine emergent wetland, 0.32 acres of palustrine scrub-shrub wetland and 3.11 acres of palustrine forested wetland would potentially be lost due to construction. In addition, approximately 1.10 acres of open water would potentially be shaded by new bridge/culvert spans. Total potential wetland/watercourse impact in this segment is approximately 7.59 acres, including direct and shading impacts. Approximately 0.01 acres of the total impacted wetlands would be impacted by the construction of stormwater detention basins in this segment.

Interchange 6 to Interchange 7

In this segment of the Project Corridor, approximately 10.35 acres of roadside ditch, 0.50 acres of palustrine emergent wetland, 1.58 acres of palustrine scrub-shrub wetland and 1.56 acres of palustrine forested wetland would potentially be lost due to construction. In addition, approximately 0.27 acres of open water would potentially be shaded by new bridge/culvert spans. Total potential wetland/watercourse impact in this segment is approximately 14.26 acres, including direct and shading impacts. Wetlands may be impacted by the construction of stormwater detention basins in this segment, but impacts are unknown because the basins are outside the wetland delineation study limits and will not be designed until the Final Design Phase. However, wetland impacts associated with the proposed basins will be addressed in the Individual Freshwater Wetlands Permit to be submitted for the Proposed Project.

Interchange 7 to Interchange 7A

In this segment of the Project Corridor, approximately 10.53 acres of roadside ditch, 2.37 acres of palustrine emergent wetland, 2.07 acres of palustrine scrub-shrub wetland and 11.13 acres of palustrine forested wetland would potentially be lost due to construction. In addition, approximately 2.46 acres of open water would potentially be shaded by new bridge/culvert spans. Total potential wetland/watercourse impact in this segment is approximately 28.56 acres, including direct and shading impacts. Wetlands may be impacted by the construction of stormwater detention basins in this segment, but impacts are unknown because the basins are outside the wetland delineation study limits and will not be designed until the Final Design Phase. However, wetland impacts associated with the proposed

Table 4.26
Potential Wetland/Watercourse Impacts

Cut or Fill Impacts (Acres)									
Turnpike Sections	**Ditch**	**PEM**	**PSS**	**PFO**	**POW**	**R2UB**	**R3UB**	**R4UB**	**Total**
Assiscunk Creek to Int. 6	2.45	0.61	0.32	3.11	0.0	0.0	0.0	0.0	**6.49**
Int. 6 to Int. 7	10.35	0.50	1.58	1.56	0.0	0.0	0.0	0.0	**13.99**
Int. 7 to Int. 7A	10.53	2.37	2.07	11.13	0.0	0.0	0.0	0.0	**26.10**
Int. 7A to Int. 8	11.52	2.16	1.49	9.67	0.01	0.0	0.0	0.0	**24.85**
Area Around Relocated Int. 8	2.02	14.69	0.20	3.10	0.0	0.0	0.0	0.0	**20.01**
Int. 8 to Int. 8A	12.65	0.37	0.0	0.31	0.0	0.0	0.0	0.0	**13.33**
Int. 8A to Int. 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**49.52**	**20.7**	**5.66**	**28.88**	**0.01**	**0.0**	**0.0**	**0.0**	**104.77**

Under Structure-Shadings (Acres)									
Turnpike Sections	**Ditch**	**PEM**	**PSS**	**PFO**	**POW**	**R2UB**	**R3UB**	**R4UB**	**Total**
Assiscunk Creek to Int. 6	0.0	0.0	0.0	0.0	0.0	0.75	0.35	0.0	**1.10**
Int. 6 to Int. 7	0.0	0.0	0.0	0.0	0.0	0.26	0.01	0.0	**0.27**
Int. 7 to Int. 7A	0.0	0.0	0.0	0.0	0.0	1.64	0.40	0.42	**2.46**
Int. 7A to Int. 8	0.0	0.0	0.0	0.0	0.0	0.79	0.0	0.0	**0.79**
Area Around Relocated Int. 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Int. 8 to Int. 8A	0.0	0.0	0.0	0.0	0.0	4.27	0.12	0.07	**4.46**
Int. 8A to Int. 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**7.71**	**0.88**	**0.49**	**9.08**

Legend: Ditch Roadside Ditch/Swale
PEM Palustrine Emergent Wetland
PSS Palustrine Scrub-Shrub Wetland
PFO Palustrine Forested Wetland
POW Palustrine Open Water
R2UB Riverine Lower Perennial Unconsolidated Bottom
R3UB Riverine Upper Perennial Unconsolidated Bottom
R4UB Riverine Intermittent Unconsolidated Bottom

Source: The Louis Berger Group, Inc./Dewberry-Goodkind, Inc., 2006

basins will be addressed in the Individual Freshwater Wetlands Permit to be submitted for the Proposed Project.

Interchange 7A to Interchange 8

In this segment, approximately 11.52 acres of roadside ditch, 2.16 acres of palustrine emergent wetland, 1.49 acres of palustrine scrub-shrub wetland, 9.67 acres of palustrine forested wetland and 0.01 acres of palustrine open water would potentially be lost due to construction. In addition, approximately 0.79 acres of open water would potentially be shaded by new bridge/culvert spans. Total

potential wetland/watercourse impact is approximately 25.64 acres, including direct and shading impacts. No wetland areas are anticipated to be impacted area by proposed stormwater detention basins.

The Area Around Relocated Interchange 8

In this area, approximately 2.02 acres of roadside ditch, 14.69 acres of palustrine emergent wetland, 0.20 acres of palustrine scrub-shrub wetland and 3.10 acres of palustrine forested wetland would potentially be lost due to construction. No open water would be shaded by new bridge/culvert spans. Total potential wetland/watercourse impact in this area is approximately 20.01 acres, all attributed to direct impact. No wetland areas are anticipated to be impacted area by proposed stormwater detention basins.

Interchange 8 to Interchange 8A

In this segment of the Project Corridor, approximately 12.65 acres of roadside ditch, 0.37 acres of palustrine emergent wetland and 0.31 acres of palustrine forested wetland would potentially be lost due to construction. In addition, approximately 4.46 acres of open water would potentially be shaded by new bridge/culvert spans. Total potential wetland/watercourse impact in this segment is approximately 17.79 acres, including both direct and shading impacts. Wetlands may be impacted by the construction of stormwater detention basins in this segment, but impacts are unknown because the basins are outside the Project Corridor and its wetland delineation study limits and will not be designed until the Final Design Phase. However, wetland impacts associated with the proposed basins will be addressed in the Individual Freshwater Wetlands Permit to be submitted for the Proposed Project.

Interchange 8A to Interchange 9

In this segment of the Project Corridor, wetlands (mostly roadside ditches) along the Turnpike mainline will not be impacted, although some of the wetland transition areas may be impacted by paving of the additional lane in each direction. Wetlands may be impacted by the construction of stormwater detention basins in this segment, but impacts are unknown because the basins are outside the Project Corridor and its wetland delineation study limits and will not be designed until the Final Design Phase. However, wetland impacts associated with the proposed basins will be addressed in the Individual Freshwater Wetlands Permit to be submitted for the Proposed Project.

4.13.4.4 Wildlife

The most common effects on wildlife occurring within or adjacent to the Project Corridor will result from the elimination and alteration of habitats. Most of these habitat impacts will be minor as they will primarily affect common habitats with relatively low wildlife diversity. Birds, mammals, and herptiles utilizing the mowed turf along the Turnpike will be displaced. The mowed turf is used for feeding by these species and will rapidly be replaced following construction; therefore, impacts to this minor habitat will be insignificant.

The larger tracts of agricultural land in the Project Corridor, although supporting a relatively low diversity of wildlife, provide nesting habitats for upland bird species. However, in these agricultural fields, the majority of the disturbance resulting from the Proposed Project will be limited to the forested edge between the Turnpike toe-of-slope and the field's edge. Potential agricultural field disturbance could affect/displace ground nesting birds and small mammals. Because these areas are disturbed at least twice a year (spring planting and fall harvest), wildlife must be tolerant or absent during this active agricultural use.

The scrub-shrub areas are developing habitat that are approximately 10 years old. With the natural process of succession taking place, wildlife utilization changes over time. Typically, these areas evolve from abandoned agricultural land, to thick early successional shrub and tree saplings to a young forest which shades shrubs and herbaceous plants. Potential impacts to wildlife associated with scrub-shrub areas could include the displacement of shrub-nesting birds, mammals, herptiles, and amphibians.

Young forest areas are developing habitats successionally between scrub-shrub habitats and mature forest habitats. The young forest habitat consists of young trees with remnants of shrubs remaining from the scrub-shrub habitats. Within this intermediate habitat, wildlife (such as those found in scrub-shrub and mature forest habitats) with different habitat needs can utilize the young forest habitat. Potential impacts to wildlife associated with young forest areas include displacement of nesting birds, small and large mammals, herptiles and amphibians.

Mature forest areas are the final stage of ecological successional habitat located in the Project Corridor. These habitats are characterized by large, mature trees, with low to moderate understory and herbaceous growth. Potential impacts to wildlife associated with the mature forest in the Project Corridor include displacement of nesting birds, small and large mammals, herptiles, and amphibians.

Wetland areas are important principally as breeding sites for several species of herptiles and amphibians. Indirect impacts to wildlife will occur through lower water quality associated with less wetland available to 'treat' runoff before entering waterbodies or groundwater.

Construction activities will likely result in a temporary increase in noise levels to local areas along the Project Corridor, and additional noise impacts to wildlife will result from an increased traffic volume on the widened highway. Also, human activity associated with right-of-way maintenance may occur closer to areas of wildlife activity.

Deicing of the roadway during winter is not a serious direct threat to wildlife; however, high concentrations of such chemicals may kill vegetation or cause changes which, in turn, affect the species composition and abundance of wildlife in the impacted area. It is unlikely, however, that any increase in such concentrations attributable to the Proposed Project would be sufficient to cause increases in mortality.

Highway mortality is expected to remain low within the Proposed Project, as little evidence of wildlife mortality was observed during this study. Most birds crossing the highway fly high over it, although rock doves, which roost and nest under bridges and overpasses, and vultures/crows, which feed on carrion and garbage along the roadside, are occasional victims of vehicle collisions. Fencing deters mammals from entering the roadway, while amphibians and herptiles generally do not venture from their preferred habitat to enter mowed roadway edges and pavement. Incidental mortality in these species, or other roadside-inhabiting wildlife species, is not likely to increase as a result of the Proposed Project.

Wildlife impacts resulting from the Proposed Project are discussed below by Project Corridor segment. The impacts are discussed separately for birds, and mammals and herptiles within each segment.

Assiscunk Creek to Interchange 6

Avifauna

This segment consists of a mixture of agricultural land and forested areas as the dominant vegetative cover type which creates the edge effect used by bird species for breeding, resting, feeding, and courtship displays. The loss of these combined vegetative cover types (approximately 36.17 acres) will cause bird species to use other nearby habitat suitable for their seasonal needs.

Mammals and Herptiles

As with the avifauna, the major impact to mammals in this segment is the loss of the forest and its edge effect with agricultural land. As a result, mammals will be required to relocate to other areas adjacent to the impacted area.

Herptiles and reptiles that use the wetlands, open waters (Assiscunk Creek, Crafts Creek and tributary to Crafts Creek) and adjacent upland areas in this segment may be impacted due to construction activity. The more mobile animals will be able to relocate to adjacent areas, but some species loss may occur to slow-moving species or species that live underground.

Interchange 6 to Interchange 7

Avifauna

The dominant vegetative cover type anticipated to be impacted in this segment is forested area (approximately 28.63 acres), which harbors forest-dwelling bird species. As stated above, the loss of this forested area will cause bird species to use other nearby habitat suitable for their seasonal needs.

Mammals and Herptiles

Herptiles and reptiles that use the wetlands, open waters (tributary to Crystal Lake and Blacks Creek) and adjacent upland areas in this segment may be impacted due to construction. Mammals will be required to relocate to other areas adjacent to the impact. The more mobile animals will be able to relocate to adjacent areas, but some species loss may occur to slow-moving species or species that live underground.

Interchange 7 to Interchange 7A

Avifauna

The dominant vegetative cover type anticipated to be impacted in this segment is agricultural land (approximately 67.53 acres). Bird species that use these areas have become accustomed to disturbance and would be more apt to relocate to other available agricultural lands during and after construction.

Mammals and Herptiles

Herptiles and reptiles that use the wetlands, open waters (Laurel Run, Thorton Creek, Crosswicks Creek, and Doctors Creek) and adjacent upland areas in this segment may be impacted due to the loss of approximately 26.10 acres of wetlands and the shading of approximately 2.46 acres of open water. Mammals will be required to relocate to other areas adjacent to the impact. The more mobile animals will be able to relocate to adjacent areas, but some species loss may occur to slow-moving species or species that live underground.

Interchange 7A to Interchange 8

Avifauna

The dominant vegetative cover type anticipated to be impacted in this segment is agricultural land (approximately 52.56 acres). Bird species that use these areas have become accustomed to disturbance and would be more apt to relocate to other available agricultural lands both during and post construction.

Mammals and Herptiles

Herptiles and reptiles that use the wetlands, open waters (Miry Run, Assunpink Creek, Bear Brook, Peddie Brook, tributary to Peddie Brook and Rocky Brook) and adjacent upland areas in this segment may be impacted due to the loss of approximately 24.80 acres of wetlands and the shading of approximately 0.79 acres of open water. Mammals will be required to relocate to other areas adjacent to the impacted area. The more mobile animals will be able to relocate to adjacent areas, but some species loss may occur to slow-moving species or species that live underground.

The Area Around Relocated Interchange 8

Avifauna

The dominant vegetative cover type anticipated to be impacted in this segment is agricultural land (approximately 24.18 acres). Bird species that use these areas have become accustomed to disturbance and would be more apt to relocate to other available agricultural lands both during and post construction.

Mammals and Herptiles

Herptiles and reptiles that use the wetlands, open waters (Timber Run Creek) and adjacent upland areas in this segment may be impacted due to the loss of approximately 20.01 acres of wetlands. Mammals will be required to relocate to other areas adjacent to the impact. The more mobile animals will be able to relocate to adjacent areas, but some species loss may occur to slow-moving species or species that live underground.

Interchange 8 to Interchange 8A

Avifauna

The dominant vegetative cover type proposed to be impacted in this segment is mowed turf (approximately 23.59 acres). The limited number of bird species that use these mowed areas have become accustomed to disturbance and would be more apt to relocate to other available lands both during and post construction.

Mammals and Herptiles

Herptiles and reptiles that use the wetlands, open waters (Timber Run Creek, Millstone River, Indian Run Brook, Cranbury Brook, Cedar Brook and Shallow Brook) and adjacent upland areas in this segment may be impacted due to the loss of approximately 13.30 acres of wetlands and the shading of approximately 4.46 acres of open water. Mammals will be required to relocate to other areas adjacent to the impacted area. The more mobile animals will be able to relocate to adjacent areas, but some species loss may occur to slow-moving species or species that live underground.

Interchange 8A to Interchange 9

Avifauna

The dominant vegetative cover type proposed to be impacted in this segment is mowed turf. The limited number of bird species that use these mowed areas have become accustomed to disturbance and would be more apt to relocate to other available lands both during and post construction. Bird species that use habitat in the proposed detention basins will be required to relocate to other areas adjacent to the impacted areas.

Mammals and Herptiles

As with bird species mentioned above, small mammals and herptiles that use mowed turf will be required to relocate to other areas adjacent to the impacted areas. Similarly mammals and herptiles that use habitat in the proposed detention basins will be required to relocate to other areas adjacent to the impacted areas.

4.13.5 Threatened and Endangered Species and Critical Habitat

Potential impacts associated with state and federal special status plant and animal species that are protected under the *N.J. Endangered and Nongame Species Conservation Act* (N.J.S.A. 26:2A-1 et seq.) and the federal *Endangered Species Act of 1973* (16 U.S.C. 1531 et seq.) are discussed below. The New Jersey Natural Heritage Program, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) have identified potential habitat where the likely presence of special status plant and animal species, or their habitats occur within the vicinity of the Project Corridor (Appendix B).

4.13.5.1 N.J. Landscape Project Database

Based on information provided in the N.J. Landscape Project Database GIS mapping (Version 2.0, 2004) and correspondence from the Natural Heritage Program, and as reported in Section 3.14.6, the following potential impacts to special status species have been identified.

At M.P. 53.7, impacts to potential habitat for the state-endangered Cooper's hawk involve the clearing of forested areas that the species utilizes for nesting and foraging activities. Potential impact to this over 50 acre forested area is approximately 1.63 acres. Approximately 0.29 acres of habitat will be impacted by a proposed detention basin.

At M.P. 55.5, impacts to the state-threatened and breeding bobolink, found in the large agricultural fields, will be minimal because the field habitat will not be impacted.

At M.P. 61.0, impacts to potential habitat for the state-endangered vesper sparrow and state-threatened savannah sparrow, found in the large agricultural fields located between M.P. 61.0 and M.P. 63.2, will be minimal because the field habitat will not be impacted.

4.13.5.2 U.S. Fish and Wildlife Service

Correspondence from the USFWS recommended that a habitat assessment survey for the state- and federally-listed bog turtle (*Clemmys muhlenbergii*) be undertaken at Thorton Creek (M.P. 55.3). Also, during wetland delineation field work, potential bog turtle habitat was found at the Assunpink Creek crossing (M.P. 63.3). Field studies for these two areas took place in May 2006. Bog turtles prefer open meadow to partially scrub-shrub wetland habitat with mucky soils and a spring-fed water source.

The bog turtle habitat survey at the Thorton Creek area did not identify suitable habitat for bog turtles on either side of the Turnpike. The habitat on the southbound side of the Turnpike consisted of firm/disturbed soils in an emergent wetland along an underground utility corridor with forested wetlands adjacent. No mucky soils were found, nor a spring-fed water source.

The northbound side of the Turnpike at M.P. 55.3 consists of the headwaters to Thorton Creek. These headwaters originate in a forested wetland that drains west, under the Turnpike into the wetland mentioned above. The soils were not mucky and no emergent or scrub-shrub habitat was observed. Therefore this area was not identified as suitable bog turtle habitat.

The area around Assunpink Creek did identify suitable bog turtle habitat, but no bog turtles were sighted during field assessments. Wetlands on the southbound side of the Turnpike (approximately four acres) contain mucky soils in an emergent and scrub-shrub setting. A smaller area (approximately 0.5 acres) was identified on the northbound side, northeast of the creek. It also contained mucky soils in an emergent and scrub-shrub setting. Potential acquisition of the bog turtle habitat is approximately 0.15 acres.

4.13.5.3 National Marine Fisheries Service

Response from the NMFS states that seasonal restrictions for in-water work in Assiscunk Creek may be warranted between March 1 and May 31 for alewife (*Alosa pseudoharengus*), an anadromous species.

4.13.6 Mitigation of Impacts

4.13.6.1 Aquatic Communities

Although some adverse impacts to aquatic communities would be expected during the construction and subsequent use of the Turnpike, there are a number of ways to minimize these effects. Many of these measures are described in Section 4.10.5 (Soils and Geology Impacts and Mitigation) and Section 4.11.5 (Water Quality Impacts and Mitigation), and wherever possible should be instituted throughout the final design and construction phase of the Proposed Project. The measures that are most effective in mitigating impacts to aquatic communities are briefly discussed below.

Staging of Construction

Construction and associated grading operations would be scheduled so that a minimal amount of soil surface is exposed at any time. Vegetative soil stabilization techniques would be employed as quickly after clearing as possible, especially in steeply sloped areas where soils are most at risk of erosion. These mitigation measures will be practiced throughout the Project Corridor, particularly during the spring and fall seasons when fish are spawning and migrating.

Sediment and Erosion Control

Soil stabilization techniques used during the construction phase are of critical importance in controlling sedimentation of Project Corridor streams. The details of these mitigation measures are presented in Section 4.10.5. These mitigation measures would be particularly useful in reducing the threat of benthos becoming buried by sediment deposition and fish being displaced by high turbidity or physiologically affected by suspended sediment. The need for this mitigation will be particularly important for small streams which provide favorable habitat for fish and benthic populations.

Bank Stabilization

Although some bank erosion is normal in a healthy stream, excessive erosion is detrimental to fish and macroinvertebrate habitat and can lead to an increase in sediment deposition downstream. Bank stabilization will help to maintain the stability of streams in the Project Corridor, especially considering that many of these streams receive stormwater runoff directly from the Turnpike. By implementing simple techniques such as riprap and boulder placement, bank stabilization can be greatly improved. Bank stabilization would be particularly useful for the smaller streams in the corridor, which are especially prone to erosion from stormwater flow. Biotechnical methods (i.e., seeding, planting, coir logs) will be used in locations where riparian vegetation is removed or seriously disturbed by

construction activities. Netting, in conjunction with planting and seeding efforts, will provide additional protection to stream banks until vegetation becomes well established.

Canopy Cover

Natural canopy cover creates shade which protects streams from overheating in the warmer weather and from becoming overgrown with fouling vegetation. This shade functions to promote healthy fish and benthic populations. Riparian vegetation cleared during construction would be replaced to restore the natural stream canopy cover, ensuring that project impacts to aquatic communities are short-term.

Work Windows

While the streams in the Project Corridor are classified by NJDEP as "nontrout waters", many of these streams do support healthy and diverse fish populations. NMFS reports that alewife (*Alosa pseudoharengus*), an anadromous species, may be present in Assiscunk Creek seasonally. Because of this, NMFS recommends a seasonal restriction for in-water work in Assiscunk Creek between March 1 and May 31 of any year.

Construction-Related Pollutants

A variety of potential pollutants are used during construction activities. For many of these, effective erosion and runoff control devices will reduce the likelihood that these pollutants could make their way to Project Corridor streams. Adequate disposal facilities and best management practices will help to control accidental release of contaminants. Proper maintenance of construction equipment and vehicles will reduce the likelihood of petroleum hydrocarbons entering streams. Pesticides and herbicides will be used in the recommended dosages and containers will be properly disposed of. Fertilizers will be tilled into soils and application staged in several dosages. Solid waste and construction debris will not be dumped into streams or left at construction sites.

4.13.6.2 Upland Vegetative Habitats

Although direct loss of upland vegetative habitat will result from the Proposed Project through vegetation removal and slope cutting/filling for roadways and excavation for stormwater detention basins, minimization of impacts associated with upland vegetative habitats can also be accomplished in a number of ways. These measures are described in Section 4.10.5 (Soils and Geology Impacts and Mitigation) and Section 4.11.5 (Water Quality Impacts and Mitigation). Those minimization measures that are most effective in mitigating impacts to upland vegetation habitats are briefly discussed below.

Replacement of Vegetation

The majority of upland vegetation that will be impacted by the associated roadway and not paved will be replaced with new areas of mowed turf following revegetation of the embankments and adjacent areas, although not all of the areas within the widened right-of-way will be maintained as part of mowed turf. Once primary vegetation has become established, some areas will not be maintained. With time, these newly-abandoned areas will undergo successional changes resulting in the replacement of most of the vegetative communities that were impacted. The small vegetated drainage ditches that run parallel to the Turnpike will be replaced, as practical, with new vegetated drainage ditches within the new Turnpike right-of-way.

Staging of Construction

As discussed in Section 4.13.6.1 above for Aquatic Communities, construction and associated grading operations for the Proposed Project will be scheduled so that a minimal amount of soil surface is exposed at any time. This will allow vegetative soil stabilization techniques to be employed as quickly after clearing as possible, especially in steeply-sloped areas where soils are most at risk of erosion with a lack of vegetation. These mitigation measures will be practiced throughout the Project Corridor.

Reforestation Act

Mitigation measures will focus on replacement of lost trees within available portions of the Turnpike right-of-way, taking into consideration required tree offset and clear zones related to roadside safety requirements. As this area may be insufficient to meet the *No Net Loss Reforestation Act* requirements, additional means to satisfy the Act may be warranted.

Additional means to satisfy the Act may include negotiations with the Division of Parks and Forestry to produce the ability to creatively combine any necessary environmental mitigation efforts. For example, it may be appropriate to combine any required wetland mitigation efforts, especially those that may involve tree planting either in wetland or upland buffer zones, with the requirements of the Reforestation Act, thereby mitigating one or more regulated impacts in one combined mitigation site. It may also be applicable that the potential purchase of wetland credits from an approved bank may also serve to meet the Reforestation Act requirements if the wetland bank is partially composed of treed habitat. An additional means to meet the Act's requirements may include a monetary contribution to the Division of Parks and Forestry to plant trees in parks and along streets. These off-site plantings may or may not occur within the municipalities of the Project Corridor.

4.13.6.3 Regulated Wetlands

Because of the potential extent of wetland impacts and the narrow width of the Turnpike property itself, which lacks additional unused uplands, wetland mitigation may require a creative, integrated approach to comply with state requirements. Wetland mitigation alternatives for impacts resulting from the Proposed Project can consist of a combination of several activities including: creation, enhancement, preservation, restoration, and/or payment into a wetland mitigation fund.

Because wetlands exhibit different functions and values, and created wetlands do not necessarily replace these functions and values equally to those of impacted wetlands, a wetland mitigation ratio is used in determining replacement area. Typically, roadside ditches/swales are of an ordinary resource value and are replaced at a 1:1 ratio. Intermediate and exceptional value wetlands (forested wetlands and special status species habitat wetlands) are typically replaced at a 2:1 or higher ratio (2 acres of created wetland for every 1 acre of impacted wetland).

NJDEP recommends that on-site mitigation be the first choice; if unused, non-forested upland is available. This option would entail using lands that the Authority owns or could purchase and construct wetland mitigation areas. As the Authority has limited land available, this option likely would not fulfill the need for wetland mitigation for the entire project.

Another option is offsite wetland mitigation to compensate for wetland impacts associated with the Proposed Project. This approach is to: identify potential mitigation sites though site selection on or in close proximity to the Turnpike; perform technical studies, including inventorying baseline vegetation, soils and hydrology; conduct a suitability assessment to identify the best candidate wetland mitigation site(s); and prepare a Conceptual Mitigation Plan to identify successful wetland mitigation areas within each Watershed Management Area (WMA) where impacts occur.

A third mitigation option is the use of wetland mitigation banks within the WMA where wetland impacts occur. The state is divided into 20 WMAs based upon major watersheds. The Proposed Project is located within four of these WMAs. From south to north along the Turnpike, these WMAs are: 20, 11, 10, and 9 (see Section 3.12.3.1). The Wetlands Mitigation Council of NJ maintains a list of each WMA and approved mitigation banks operating within each WMA.

Project-related wetland impacts identified within each WMA are as follows: WMA 20 = 54.01 acres; WMA 11 = 12.51 acres; WMA 10 = 46.65 acres; and WMA 9 = 0.67 acres.

Enhancement of wetlands is improving the function and value of an existing degraded wetland. This can be done through on- or off-site wetland mitigation creation or through a wetland mitigation bank. The replacement ratio is higher (typically 3:1) for wetland enhancement because no new wetlands are created.

As with enhancement, wetland restoration is returning an existing degraded wetland to its historic function (i.e., agricultural land). This can be done through on- or off-site wetland mitigation enhancement or through a wetland mitigation bank. The replacement ratio is again higher (typically 3:1) for wetland restoration because no new wetlands are created.

The preservation option to wetland mitigation can be used to preserve wetlands as well as upland habitats. The replacement ratio for preservation is very high (typically 27:1). With preservation, a parcel can be purchased and deed-restricted by the Authority and then turned over to the state or to a non-profit organization for future use and management.

The roadside ditches/swales that are expected to be impacted by the Proposed Project as regulated wetlands, require mitigation. It is anticipated that mitigation will be at a low ratio due to the intermediate to low resource value of these impacted wetlands. These impacts may be partially mitigated through construction of replacement ditches along the proposed toe-of-slope for the additional roadway lanes.

In addition to the physical impacts to wetland habitats, two other types of impacts are regulated by NJDEP; these include shading from bridge structures and transition area impacts. Shading impacts to wetlands and open waters are regulated by NJDEP because the vegetation/wildlife habitat below the structure will be reduced by lack of sun.

As the Proposed Project will remove greater than ½ acre of trees, compliance with the *N.J. Reforestation Act* is required. This replacement plan could be incorporated into the wetland mitigation plan, where forested wetlands are created. Thus, wetland mitigation could assist in complying with the *N.J. Reforestation Act*.

4.13.6.4 Wildlife

Because avian and terrestrial wildlife utilize both upland and wetland vegetative communities, mitigation efforts for wildlife will be the same as those previously discussed for Upland Vegetative Habitats and Regulated Wetlands.

In general, the most important avian use of terrestrial habitats along the Turnpike is for nesting. Destruction of nests can be minimized by clearing these habitats during nonbreeding season (August-March). Further reduction in the size of forest fragments adjacent to the Turnpike can be achieved by removing the smallest possible amount of this habitat.

Impacts to such avian habitats as mowed, landscaped, residential, golf course, dry sand borrow-pit and industrial parks, will be minimal and no mitigation will be required. The redevelopment of old field habitat beyond the mowed margin of the widened roadway will be hastened by the planting of fruit-bearing trees and shrubs utilized by birds.

The most sensitive areas for mammals, reptiles, and herptiles are in the vicinity of the wetlands. In addition to the mitigation measures listed above and below, a wildlife collection and removal program will be implemented in wetland areas. Prior to actual construction, a team of naturalists will collect and remove small mammals, reptiles, and amphibians from the immediate impact areas. The collected animals will be released elsewhere in areas with similar, suitable habitat. The collection program will be started at least three months prior to construction.

4.13.6.5 Threatened and Endangered Species and Critical Habitat

State and federal agencies could impose construction timing restrictions so that work would be done outside the species breeding, nesting or habitat use periods. Also, mitigation for impacted habitat could be required by the agencies in forms of reduced impact, restoration or preservation as discussed below.

Construction constraints in areas where the Natural Heritage Program has identified special status species habitat could occur. Habitat for the threatened or endangered species (bobolink, Cooper's hawk, savannah sparrow and vesper sparrow) is protected by the State, and if the habitat is part of a wetland system, the wetland is deemed an Exceptional Wetland with a required transition area buffer of 150 feet.

Construction activity at Interchange 7A could potentially impact potential habitat for the state-threatened Coopers hawk at M.P. 53.7. This involves clearing of forested areas that the species utilizes for nesting and foraging activities. Because the area of potential impact will be minimal (approximately 1.63 acres), and an existing sound barrier will be relocated to aid in reduced noise from the Turnpike, impacts to potential Coopers hawk habitat will be minimal. In addition, certain construction activities could have timing restrictions imposed upon them by NJDEP during the hawk's breeding season (May 15-August 15). Surveys may be required to be performed immediately prior to the breeding season and immediately prior to construction to ascertain if an active nest is located in the area.

Disturbance to breeding bobolink, found in the large agricultural fields at M.P. 55.5, will be minimized because the field habitat will not be impacted. Construction equipment will be kept out of this valuable habitat, as necessary.

As with the bobolink, two additional special status bird species utilize agricultural fields in the Project Corridor. These include the state-endangered vesper sparrow and state-threatened savannah sparrow. Potential habitat for both bird species was identified by NJDEP as occurring in large agricultural fields between M.P. 61.0 and M.P. 63.2. Disturbance to these bird species will be minimized as field habitat will not be acquired in this area.

Because suitable bog turtle habitat was identified at the Assunpink Creek crossing (M.P. 63.3), additional studies for the listed bog turtle may be warranted. If turtle habitat is impacted, NJDEP permit requirements may include mitigation measures, including seasonal construction constraints, seasonal exclusion fencing and associated monitoring. A retaining wall is proposed along the northbound and southbound lanes of the Turnpike at the Assunpink Creek crossing to minimize impacts to the wetland and potential bog turtle habitat.

NMFS reports that alewife (*Alosa pseudoharengus*), an anadromous species, may be present in Assiscunk Creek seasonally. Because of this, NMFS recommends a seasonal restriction for in-water work in Assiscunk Creek between March 1 and May 31 of any year.

4.13.7 Summary

The results of this evaluation indicate that the Proposed Project avoids environmental impacts where possible. Where unavoidable impacts occur, suitable mitigation measures would be taken in order that the project would not result in significant adverse environmental impacts that cannot be mitigated.

4.14 Infrastructure

4.14.1 Introduction

Under state statutes, public utilities may use highway rights-of-way for the purpose of installing utility facilities, provided such use will not interfere with the use of the right-of-way for highway purposes. While large-scale highway widening projects have the intent to improve traffic circulation within their respective facilities, they also have the potential to impact (in the form of service disruptions, or displacement and relocation) the existing utilities and transportation facilities that either cross or are located adjacent to the existing rights-of-way of those highways. As listed in the infrastructure inventory (Table 3.62), the Turnpike's right-of-way in the Project Corridor is crossed and/or abutted by 14 major and 156 local utility lines as well as 45 roadway crossings (of which some would have to be relocated during construction), and 3 railroad lines. Impacts to existing utilities and transportation facilities were evaluated based on the review of the Proposed Project's preliminary design plans. Impact evaluations were differentiated between direct impacts associated with the proposed widening and impacts associated with the construction of stormwater detention basins required to mitigate water quality impacts.

Between Interchange 8A and Interchange 9, no significant impacts to infrastructure are expected because the three-lane dualized roadway, including new embankments and bridge structures, had already been designed and built as part of the previous 1985-1990 Turnpike Widening Program, where all necessary mitigation actions to existing utilities and transportation facilities had already been taken.

While roadway drainage and stormwater management design are critical issues to transportation projects, NJDEP also requires that major development that disturbs more than 1.0 acre of land or increases impervious surface by 0.25 acre or more address surface water hydrology and water quality to the maximum extent practical through the implantation of the state's Stormwater Management (SWM) Rules (N.J.A.C. 7:8). Despite efforts made during the Proposed Project's preliminary design phase not only to maintain the existing drainage patterns but also to maximize the use of swales or other non-structural best management practices (BMPs) in order to address the NJDEP requirements, it is estimated than more than 60 basins (either detention or bio-retention facilities) have to be constructed along the Project Corridor. In turn, those facilities would increase the need for additional right-of-way acquisition and would have the potential to further impact existing infrastructure, especially abutting petroleum and natural gas pipelines. At each detention basin location where existing petroleum and natural gas pipelines will be unaffected by the actual widening, such supplementary impacts were also evaluated.

4.14.2 Data Sources and Methodology

For the purpose of evaluating the effects of the Proposed Project on area infrastructure, all potential impacts (i.e., service disruption, displacement and relocation) have been identified and discussed. This discussion also includes any planned or committed improvements or expansion of infrastructure services, as well as the adequacy and capacity of the infrastructure to support any secondary and cumulative impacts resulting from the Proposed Project.

In light of any potential construction or operational impacts to existing water supply and wastewater treatment associated with any expanded or relocated facilities along the Turnpike (i.e., service areas or toll plazas), the Proposed Project was also evaluated for compliance with NJDEP's statewide and area-wide Water Quality Management Plans (WQMP) and respective local Wastewater Management Plans (WMP) pursuant to Section 208 of the federal Clean Water Act and the New Jersey Water Quality Planning Act (N.J.S.A. 58:11A-1 et seq.).

Additionally, all reasonable and practicable mitigation measures (i.e., structure reinforcement, temporary interruption during low peak periods, etc.) to reduce or eliminate project-induced impacts to infrastructure were identified and discussed. While the Proposed Project has considered all practicable attempts to avoid direct impacts to existing facilities, any unavoidable impacts were evaluated in terms of alternative relocation schemes and construction costs with the individual utility companies, as well as in terms of identifying any necessary lead time for delivery of special materials, seasonal restrictions, and relocation schedules.

4.14.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes. Consequently, there would be no direct or indirect impact to existing infrastructure in the Project Corridor.

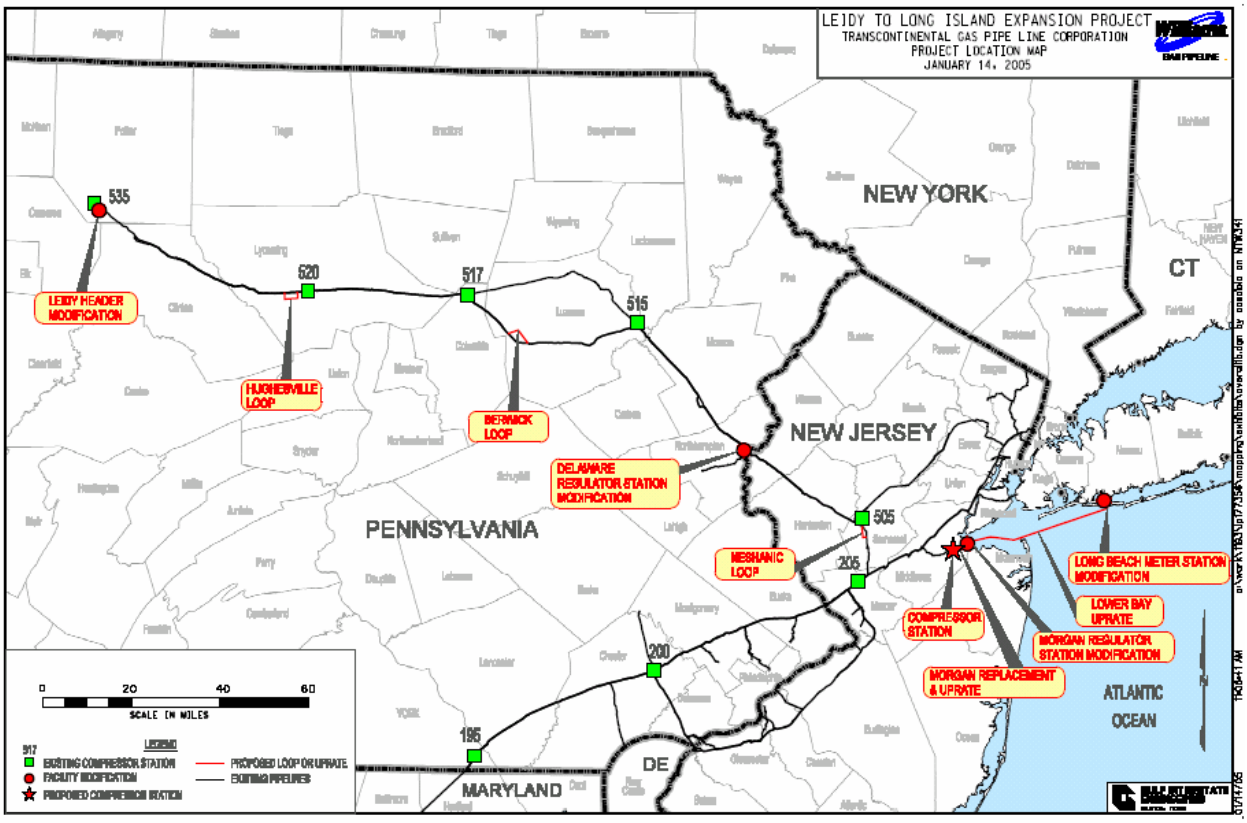
Upon review of nearby projects as listed by the Federal Energy Regulatory Commission (FERC), one major utility project sponsored by Transcontinental Gas Pipeline Corporation (Transco) was identified in the counties of the Project Corridor. This committed project is referred as the Leidy to Long Island Expansion Project, where Transco proposes to expand its existing natural gas transmission system to provide 100,000 dekatherms per day of transportation capacity from the Leidy Hub in Pennsylvania to Long Island, New York with construction and upgrade of several pipeline segments between those two termini. Among numerous segments of this project, the proposal would include the upgrading and replacement of approximately 1.7 miles of 42-inch-diameter pipeline (referred as the Morgan Replacement), and the construction and operation of a 10,000-horsepower compressor station in eastern Middlesex County. Transco proposes to place the project in service by November 2007. On June 2, 2005, a Notice of Intent to prepare an Environmental Assessment (EA) was published in the *Federal Register* and the EA is currently being prepared. While this expansion project would not directly involve the Transco pipeline segments located within the Project Corridor (see Figure 4-2), it could have some repercussions to the Turnpike if any further capacity increases or design modifications to this expansion project become necessary in the future.

A second future project, sponsored by JCP&L, entails a second 34.5-kV overhead electric transmission line at M.P. 64.90 that is currently in the planning stage. This new transmission line would be sited in the same right-of-way as the existing 34.5-kV transmission line and have an aerial crossing over the Turnpike. Therefore, this project is not expected to have any impact to the Proposed Project.

Upon consultation with local municipalities and local utility service operators, the following committed local infrastructure projects have been identified in the Project Corridor:

- According to the Township of East Windsor, the existing bridge and roadway of Wyckoff Mills Road (M.P. 68.4), currently providing one lane in each travel direction, will be improved due to the construction of numerous residential developments to the west of the Turnpike crossing.

Figure 4-2
Transco's Proposed Leidy to Long Island Expansion Project



- According to the Township of Cranbury, a second 12-inch water main, operated by NJ American Water, would be constructed at M.P. 72.1 within the existing 48-inch sleeve that crosses beneath the Turnpike. This new sewer main would not be impacted by the Proposed Project

4.14.4 Proposed Project Impacts

4.14.4.1 Construction Impacts

While detailed impacts are further discussed below by infrastructure type, Table 4.27 summarizes all potential impacts to utilities and transportation facilities identified between Assiscunk Creek and Interchange 9. The table also indicates potential mitigation actions (i.e., relocation or realignment) to the impacted infrastructure. Review of Table 4.27 confirms that the majority of the potential infrastructure impacts would occur south of M.P. 73.0 (between Assiscunk Creek and Interchange 8A).

As noted in the table, no significant infrastructure impacts would occur between Interchange 8A and Interchange 9, with the exception of some partial (or segmental) relocations to the Colonial and Texas Eastern pipelines as further described below.

Table 4.27
Potential Impacts to Utilities and Transportation Facilities from Assiscunk Creek to Interchange 9

Approx. Milepost	Infrastructure Element, Description, Locational Feature, and Operator	Relation to Turnpike	Impact (Yes/No)		Notes
Assiscunk Creek to PHMTE Connection					
48.2-50.95	30-inch Colonial petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
48.2-50.95	16-inch Sunoco petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
48.3-50.95	500-kV PSE&G electric transmission line (New Freedom-Deans Line) running parallel to NB side	Ab.	--	NO	--
48.2-50.95	NJTA's fiber optic cable running parallel to SB side	Ab.	YES	--	To be relocated
48.2-50.95	36-inch Transco natural gas pipeline running parallel to SB side	Ab.	YES	--	Partial relocations required
48.2-50.95	16-inch Transco natural gas pipeline running parallel to SB side	Ab.	YES	--	Partial relocations required
49.15	**Columbus-Florence Road (CR 543)**	Opass	YES	--	To be realigned
	Overhead electric line in four 3.5-inch conduits on bridge structure (PSE&G)	Opass	YES	--	
	Overhead telephone line in two 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	YES	--	
50.06	**Hedding Road (CR 628)**	Opass	YES	--	To be realigned
	Overhead telephone line in two 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	YES	--	
50.50	Sunoco metering station on the NB side	Ab.	YES	--	To be relocated
50.50	**Mill Lane (abandoned Penn. RR Kinkora Branch)**	Upass	--	NO	--
50.50	**Hedding Avenue (Local Road)** (*no utilities at crossing*)	Upass	--	NO	--
50.95	**Columbus-Hedding Road (CR 678)**	Opass	YES	--	To be rebuilt online
	8-inch natural gas main in conduit on bridge structure (PSE&G)	Opass	YES	--	
PHMTE Connection to Interchange 7					
50.95-52.50	36-inch Transco natural gas pipeline running parallel to SB side	Ab.	YES	--	Partial relocations required
50.95-52.50	16-inch Transco natural gas pipeline running parallel to SB side	Ab.	YES	--	Partial relocations required
50.95-53.75	500-kV PSE&G electric transmission line (New Freedom-Deans Line) running parallel to NB side	Ab.	--	NO	--
50.95-53.75	30-inch Colonial petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
50.95-53.75	16-inch Sunoco petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
50.95-53.75	NJTA's fiber optic cable running parallel to SB side	Ab.	YES	--	To be relocated
51.42	**Hedding-Mansfield Road (Local Road)**	Opass	YES	--	To be realigned
	Electric and telephone lines to Transco's valve station in 2-inch conduit on bridge structure (Verizon - New Jersey and PSE&G)	Opass	YES	--	
51.48	Transco valve station	Ab.	--	NO	--
52.50-53.00	132-kV PSE&G electric transmission line (Trenton-Burlington Line) running parallel to SB side	Ab.	--	NO	--
52.50-53.00	MCI/WorldCom (Lightnet) fiber optic cable running parallel to SB side	Ab.	YES	--	
52.50	36-inch Transco natural gas pipeline	UXing	--	NO	--
52.50-53.75	36-inch Transco natural gas pipeline running parallel to NB side	Ab.	--	NO	--
53.00	**U.S. Route 206**	Upass	--	NO	--
	13-kV & 26-kV overhead electric lines (PSE&G)	Upass	--	NO	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Upass	--	NO	
	Television cable (Comcast of Burlington County LLC)	Upass	--	NO	
	12-inch natural gas main in conduit on bridge structure (PSE&G)	Upass	--	NO	
	Sanitary sewer (Bordentown Sewerage Authority)	Upass	--	NO	
53.00	132-kV PSE&G electric transmission line (Trenton-Burlington Line)	AXing	--	NO	--
53.00	MCI/WorldCom (Lightnet) fiber optic cable	UXing	--	NO	--
53.00-53.75	132-kV PSE&G electric transmission line (Trenton-Burlington Line) running parallel to NB side	Ab.	--	NO	--
53.00-53.75	MCI/WorldCom (Lightnet) fiber optic cable running parallel to NB side	Ab.	--	NO	--
Interchange 7 to Interchange 7A					
53.75-54.85	36-inch Transco natural gas pipeline running parallel to NB side	Ab.	--	NO	--
53.75-56.50	132-kV PSE&G electric transmission line (Trenton-Burlington Line) running parallel to NB side	Ab.	--	NO	--
53.75-56.50	MCI/WorldCom (Lightnet) fiber optic cable running parallel to NB side	Ab.	YES	--	Partial relocations required
53.75-56.50	16-inch Transco natural gas pipeline running parallel to SB side	Ab.	YES	--	Partial relocations required
53.75-56.90	16-inch Sunoco petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
53.75-60.50	500-kV PSE&G electric transmission line (New Freedom-Deans Line) running parallel to NB side	Ab.	--	NO	--
53.75-60.50	30-inch Colonial petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
53.75-60.50	NJTA's fiber optic cable running parallel to SB side	Ab.	YES	--	To be relocated
54.00	**Bordentown-Georgetown Road (CR 545)**	Upass	--	NO	--
	13-kV overhead electric line (PSE&G)	Upass	--	NO	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Upass	--	NO	
	Television cable (Comcast of Burlington County LLC)	Upass	--	NO	
	12-inch natural gas main (PSE&G)	Upass	--	NO	
	8-inch sanitary sewer (Bordentown Sewerage Authority)	Upass	--	NO	
	12-inch water main (Bordentown Water Department)	Upass	--	NO	
54.85	36-inch Transco gas pipeline	UXing	--	NO	--
55.10	**Bordentown-Chesterfield Road (CR 528)**	Opass	YES	--	To be realigned
	Two 13-kV, two 26-kV and one 69-kV overhead electric lines (PSE&G)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	Television cable (Comcast of Burlington County LLC)	Opass	YES	--	
55.40	PSE&G Crosswicks Substation on NB side	Ab.	--	NO	--
55.80	10-inch Colonial petroleum pipeline	UXing	--	NO	--
56.38	**Ward Avenue (Local Road)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	Television cable (Comcast of Burlington County LLC)	Opass	YES	--	
56.50	132-kV PSE&G electric transmission line (Trenton-Burlington Line)	AXing	--	NO	--
56.50	MCI/WorldCom (Lightnet) fiber optic cable	UXing	--	NO	--
56.60	Colonial pressure station on NB side	Ab.	--	NO	--
56.90	16-inch Sunoco petroleum pipeline	Upass	--	NO	--
57.10	**South Broad Street (CR 672)**	Opass	YES	--	To be realigned
	13-kV overhead electric line (PSE&G)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	

Table 4.27 (Continued)
Potential Impacts to Utilities and Transportation Facilities
from Assiscunk Creek to Interchange 9

Approx. Milepost	Infrastructure Element, Description, Locational Feature, and Operator	Relation to Turnpike	Impact (Yes/No)		Notes
57.43	6-inch water main (Aqua New Jersey, Inc.)	Upass	--	NO	--
57.55	**Crosswicks-Hamilton Square Road (Local Road)**	Upass	--	NO	--
	13-kV overhead electric line (PSE&G)	Upass	--	NO	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Upass	--	NO	
	6-inch water main (Aqua New Jersey, Inc.)	Upass	--	NO	
	4-inch natural gas main (PSE&G)	Upass	--	NO	
58.10	**Yardville-Allentown Road (CR 524)**	Opass	YES	--	To be realigned
	4-kV & 13k-V overhead electric lines (PSE&G)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	Television cable (Comcast Cablevision of Central New Jersey)	Opass	YES	--	
	6-inch natural gas main (PSE&G)	Opass	YES	--	
58.10-58.40	**Uncle Petes Road (Local Road)**	Ab.	YES	--	To be realigned
	12-inch water main (Aqua New Jersey, Inc.)	Ab.	YES	--	
	6-inch sewer main (Hamilton Township Dpt. of Water Pollution Control)	Ab.	YES	--	
58.70	30-inch sleeve between service areas 6S and 6N carrying telephone (Verizon - New Jersey), water (Aqua New Jersey, Inc.), and sewer (Hamilton Township Dpt. of Water Pollution Control)	UXing	--	NO	--
59.23	**Merrick Road (Local Road)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
60.31	**Edgebrook Road (Local Road)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	Interchange 7A to Interchange 8				
60.50-65.52	500-kV PSE&G electric transmission line (New Freedom-Deans Line) running parallel to NB side	Ab.	--	NO	--
60.50-67.60	30-inch Colonial petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
60.50-67.60	NJTA's fiber optic cable running parallel to SB side	Ab.	YES	--	To be relocated
60.60	**Eastbound Route I-195** (*no utilities on structure*)	Opass	YES	--	To be rebuilt online
60.70	**Westbound Route I-195** (*no utilities on structure*)	Opass	YES	--	To be rebuilt online
60.91	**Robbinsville-Allentown Road (CR 526)**	Opass	YES	--	To be realigned
	12-inch natural gas main (PSE&G)	Opass	YES	--	
	4-kV & 13-kV ovehead electric lines (PSE&G)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
60.91	16-inch water main (Aqua New Jersey, Inc.)	Upass	--	NO	--
61.87	**West Manor Way (Local Road)**	Opass	YES	--	To be realigned
	Two 4-kV overhead electric lines (PSE&G)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
62.24	**Gordon Road (Local Road)**	Opass	YES	--	To be realigned
	13-kV overhead electric line (PSE&G)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
62.86	**Sharon Road (Local Road)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
62.86-63.00	**Breshanan Road (Local Road)**	Ab.	YES	--	To be relocated
63.43	**Windsor-Carson Road (Local Road)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
64.79	**Windsor-Perrineville Road (Local Road)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
64.90	34.5-kV JCP&L overhead electric transmission line *A second 34.5-kV transmission line is in the planning stage.*	AXing	--	NO	--
65.52	34.5-kV and 230-kV JCP&L electric transmission lines	AXing	--	NO	--
65.52	**Old York Road (CR 539)**	Opass	YES	--	To be realigned
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	8-inch natural gas main (PSE&G)	Opass	YES	--	
67.08	**Etra Road (CR 571)**	Opass	YES	--	To be realigned
	13-kV overhead electric line (JCP&L)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	8-inch natural gas main (PSE&G)	Opass	YES	--	
67.27	27-inch gravity sewer line (East Windsor MUA)	UXing	--	NO	--
67.30-67.60	Sewer Pumping Station No. 7 and 12-inch sewer force main (East Windsor MUA)	Ab.	YES	--	To be relocated
	The Area around Relocated Interchange 8				
67.60	12-inch sanitary sewer force main (East Windsor MUA)	Ab.	YES	--	To be relocated
67.60	NJTA's fiber optic cable running parallel to SB side. Also branching out from mainline to connect Toll Plaza and Central Shops.	UXing	YES	--	To be relocated
67.60	30-inch Colonial petroleum pipeline running parallel to NB side and ramp loop.	Ab.	YES	--	To be relocated
	Interchange 8 to Interchange 8A				
67.60-73.86	30-inch Colonial petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
67.60-73.86	NJTA's fiber optic cable running parallel to SB side	Ab.	YES	--	To be relocated
67.89	**N.J. Route 33 / Franklin Street**	Upass	--	NO	--
	13-kV overhead electric line (JCP&L)	Upass	--	NO	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Upass	--	NO	
	3-inch natural gas main (PSE&G)	Upass	--	NO	
	8-inch gravity sewer line (East Windsor MUA)	Upass	--	NO	
67.92	Sewer pumping station No. 10 (East Windsor MUA)	Ab.	YES	--	To be relocated
68.01	**Monmouth Road (CR 633)**	Upass	--	NO	--
	Two 34.5-kV underground electric lines (JCP&L)	Upass	--	NO	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Upass	--	NO	
	Television cable (Comcast Cablevision of Central New Jersey)	Upass	--	NO	
	4-inch natural gas main (PSE&G)	Upass	--	NO	
	12-inch water main (East Windsor MUA)	Upass	--	NO	
	Sanitary sewer (East Windsor MUA)	Upass	--	NO	
68.35	**Eastbound N.J. Route 133** (*no utilities on bridge*)	Opass	--	NO	--
68.35	**Westbound N.J. Route 133** (*no utilities on bridge*)	Opass	--	NO	--
68.40	**Wyckoffs Mills Road (Local Road)**	Opass	YES	--	To be relocated
	13-kV overhead electric line (JCP&L)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
68.40	10-inch sanitary sewer force main (East Windsor MUA)	UXing	--	NO	--

Table 4.27 (Continued)
Potential Impacts to Utilities and Transportation Facilities
from Assiscunk Creek to Interchange 9

Approx. Milepost	Infrastructure Element, Description, Locational Feature, and Operator	Relation to Turnpike	Impact (Yes/No)		Notes
69.27	**Brick Yard Road (Local Road)**	Opass	YES	--	To be relocated
	4-kV overhead electric line (JCP&L)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
	12-inch natural gas main (PSE&G)	Opass	YES	--	
69.90	**Conrail Shared Assets Operations Railroad (Hightstown Industrial Track)**	Upass	--	NO	--
69.90	**Hightstown-Cranbury Station Road (Local Road)**	Upass	--	NO	--
	13-kV and 34.5-kV overhead electric lines (JCP&L)	Upass	--	NO	
	Underground fiber optic cable (AT&T)	UXing	--	NO	
69.90-70.10	34.5-kV overhead electric line (JCP&L) running parallel to SB side	Ab.	--	NO	--
70.05	34.5-kV overhead electric line (JCP&L)	AXing	--	--	--
70.48	**Cranbury Station Road (CR 615)**	Opass	YES	--	To be relocated
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
70.48-71.26	16-inch water main (NJ American Water) running parallel to NB side	Ab.	YES	--	To be relocated
71.26	**Cranbury-Half Acre Road (Local Road)**	Opass	YES	--	To be relocated
	13-kV overhead electric line (JCP&L)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
71.26	12-inch water main (NJ American Water)	UXing	--	NO	--
71.90	Sewer pumping station located on the western edge of Service Area 7S (Cranbury Twp. Public Works)	Ab.	--	NO	--
71.70-72.10	10-inch water main running parallel to Service Area 7S and SB right-of-way (NJ American Water)	Ab.	--	NO	--
71.70-72.10	6-inch sanitary sewer force main running parallel to Service Area 7S and SB right-of-way (Cranbury Twp. Public Works)	Ab.	--	NO	--
72.10	Sewer pumping station under construction located on the SB side (Cranbury Twp. Public Works)	Ab.	YES	--	To be relocated
72.10	48-inch sleeve containing a 12-inch water main (NJ American Water) and a 6-inch sanitary sewer force main (Cranbury Twp. Public Works). *A future 12-inch water main is in the planning stage.*	UXing	--	NO	--
72.10	**Prospect Plains Road (CR 614)**	Opass	YES	--	To be relocated
	13-kV overhead electric line (JCP&L)	Opass	YES	--	
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	YES	--	
72.10-72.90	12-inch natural gas main (PSE&G) running parallel to NB side	Ab.	--	NO	--
72.90	12-inch natural gas main (PSE&G)	UXing	--	NO	--
73.07	6-inch natural gas main (PSE&G)	UXing	--	NO	--
73.20	6-inch sanitary sewer force main (Monroe Township MUA)	UXing	--	NO	--
73.20-73.42	6-inch sanitary sewer force main (Monroe Township MUA) running parallel to SB side	Ab.	--	NO	--
73.34-73.42	10-inch water main (Monroe Township MUA) running parallel to SB side	Ab.	--	NO	--
73.42	**Eastbound N.J. Route 32**	Opass	--	NO	--
	Three 3.5-inch telephone conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	
73.43	**Westbound N.J. Route 32**	Opass	--	NO	--
73.44	26-inch sleeve containing a 16-inch water main (Monroe Township MUA)	UXing	--	NO	--
73.62	4.2-kV underground electric line (JCP&L)	UXing	--	NO	--
	Interchange 8A to Interchange 9				
73.86-83.42	30-inch Colonial petroleum pipeline running parallel to NB side	Ab.	YES	--	Partial relocations required
73.86-83.42	NJTA's fiber optic cable running parallel to SB side	Ab.	--	NO	--
74.28	500-kV PSE&G overhead electric transmission line (New Freedom-Deans Line)	AXing	--	NO	--
74.31	**Conrail Shared Assets Operations Railroad (Jamesburg Branch)**	Upass	--	NO	--
	6.6-kV catenary lines (Conrail)	Upass	--	NO	--
74.39	**Cranbury-South River Road (CR 535)**	Upass	--	NO	--
	Telephone cables contained in two 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Upass	--	NO	--
	12-inch natural gas main (PSE&G)	Upass	--	NO	--
74.39-74.55	12-inch natural gas main (PSE&G) running parallel to SB side	Ab.	--	NO	--
75.55	**Ridge Road (CR 522)** (*no utilities on structure*)	Opass	--	NO	--
75.79-76.56	10-inch and 24-inch Texas Eastern natural gas pipelines running parallel to NB side	Ab.	YES		Partial relocations required
76.10	**Deans-Rhode Hall Road (CR 610)** (*no utilities on structure*)	Opass	--	NO	--
75.50-76.50	500-kV PSE&G overhead electric transmission line (New Freedom-Deans Line) running parallel to SB side	Ab.	--	NO	--
76.55	500-kV JCP&L overhead electric transmission line (Deans-Smithburg Line)	AXing	--	NO	--
	10-inch and 24-inch Texas Eastern natural gas pipelines	UXing	--	NO	--
77.07	**Davidsons Mill Road (Local Road)**	Opass	--	NO	--
	Fiber and coaxial telephone cables (overhead and underground) (Verizon - New Jersey)	Opass	--	NO	--
77.08	16-inch water main (South Brunswick Utilities Department)	UXing	--	NO	--
78.19	**Church Lane (Local Road)**	Opass	--	NO	--
	13-kV overhead electric line (PSE&G)	Opass	--	NO	--
	Telephone cables contained in four 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
	8-inch natural gas main (PSE&G)	Opass	--	NO	--
78.20	24-inch sleeve containing two 12-inch water mains (East Brunswick Public Works and Water Resources)	UXing	--	NO	--
79.31	**Hardenburg Lane (Local Road)**	Opass	--	NO	--
	13-kV overhead electric line (PSE&G)	Opass	--	NO	--
	Telephone cables contained in two 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
	12-inch water main (East Brunswick Public Works and Water Resources)	Opass	--	NO	--
	12-inch natural gas main (PSE&G)	Opass	--	NO	--
79.80	**Dutch Road (Local Road)**	Opass	--	NO	--
	Four 13-kV overhead electric lines (PSE&G)	Opass	--	NO	--
	Telephone cables contained in two 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
79.82	24-inch sleeve containing a 12-inch water main (East Brunswick Public Works and Water Resources)	UXing	--	NO	--
80.09	10-inch natural gas main (PSE&G)	UXing	--	NO	--
80.11	42-inch natural gas main (PSE&G)	UXing	--	NO	--
80.35	24-inch stormwater sewer (Milltown Department of Utilities)	UXing	--	NO	--
	10-inch sanitary sewer (Milltown Department of Utilities)	UXing	--	NO	--
80.45	**Main Street (CR 606)**	Opass	--	NO	--
	Two 4-kV electric lines contained in conduits (Milltown Department of Utilities)	Opass	--	NO	--
	Telephone cables contained in four 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
	12-inch natural gas main (PSE&G)	Opass	--	NO	--
	8-inch water main (Milltown Department of Utilities)	UXing	--	NO	--

Table 4.27 (Continued)
Potential Impacts to Utilities and Transportation Facilities
from Assiscunk Creek to Interchange 9

Approx. Milepost	Infrastructure Element, Description, Locational Feature, and Operator	Relation to Turnpike	Impact (Yes/No)		Notes
80.45-80.75	4-inch natural gas main (PSE&G) running parallel to NB side	Ab.	--	NO	--
80.75	Two 24-inch pipes encasing a 10-inch water main, a 12-inch sanitary sewer, and two 4-kV electric lines (all operated by Milltown Department of Utilities)	UXing	--	NO	--
	One concrete box culvert for stormwater	UXing	--	NO	--
80.99	**Conrail Shared Assets Operations Railroad (Sayreville Secondary Line)**	Opass	--	NO	--
	26-kV overhead electric line (JCP&L)	Opass	--	NO	--
81.09	**Ryders Lane (CR 617)**	Opass	--	NO	--
	13-kV overhead electric line (PSE&G)	Opass	--	NO	--
	Telephone cables contained in two 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
	6-inch natural gas main (PSE&G)	Opass	--	NO	--
81.09-81.58	12-inch water main running parallel to NB side (East Brunswick Public Works and Water Resources)	Ab.	--	NO	--
81.58	**Tices Corner Road (Local Road)**	Upass	--	NO	--
	4-kV overhead electric line (PSE&G)	Upass	--	NO	--
	8-inch natural gas main (PSE&G)	Upass	--	NO	--
	12-inch and 24-inch water main (East Brunswick Public Works and Water Resources)	UXing	--	NO	--
81.66	14-inch sanitary sewer Line (East Brunswick Sewerage Authority)	UXing	--	NO	--
82.13	12-inch water main (East Brunswick Public Works and Water Resources) (*Abandoned*)	UXing	--	NO	--
82.15	**Sullivan Way (Local Road)**	Opass	--	NO	--
	4-kV overhead electric line (PSE&G)	Opass	--	NO	--
	Telephone cables contained in two 3.5-inch conduits and aerial on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
82.55	10-inch sanitary sewer line (East Brunswick Sewerage Authority)	UXing	--	NO	--
82.95	24-inch natural gas main (PSE&G)	UXing	--	NO	--
82.97	**N.J. Route 18**	Opass	--	NO	--
	13-kV overhead electric line (PSE&G)	Opass	--	NO	--
	Telephone cables contained in eight 3.5-inch conduits on bridge structure (Verizon - New Jersey)	Opass	--	NO	--
	16-inch water main (East Brunswick Public Works and Water Resources)	UXing	--	NO	--

Acronyms

UXing	Underground Crossing
AXing	Aerial Crossing
Opass	Overpass
Upass	Underpass
Ab.	Abutting
NB	NJ Turnpike Northbound Lanes
SB	NJ Turnpike Southbound Lanes
MUA	Municipal Utility Authority
NJTA	NJ Turnpike Authority
PSE&G	Public Service Electric & Gas Company
JCP&L	Jersey Central Power & Light Company

Major Petroleum and Natural Gas Transmission Pipelines

At many locations, construction activity associated with the Proposed Project would extend beyond the existing limits of the Turnpike's right-of way and would impact existing underground petroleum and natural gas pipelines that parallel the roadway. At these locations, the pipelines are proposed to be relocated outside and adjacent to the proposed new Turnpike right-of-way. All relocations of utility easements and infrastructure would be conducted in kind. While encasement is expected to provide further protection to those pipelines at newly-constructed local roadway crossings and interchange or U-turn ramps, some relocation with temporary disruption of service would most likely be required.

The 30-inch Colonial petroleum pipeline, which parallels the northbound side of the Turnpike along the entire Project Corridor, would be impacted the most by the Proposed Project, with approximately 68,595 linear feet of pipeline potentially being relocated. While most of these discrete relocations would be horizontal, an estimated 340 linear feet of pipeline would only require vertical relocation to provide adequate clearance for the construction of stormwater detention basins. Given the 5.5 to 6-foot depth to the bottom of the pipeline, such vertical relocations are typically required to accommodate the drainage pipe connections from the roadway's drainage system to the detention basin, which will generally range between 4 and 6 feet in depth. The Colonial pressure station located on the northbound side of the Turnpike at M.P. 56.60 would not be impacted by the Proposed Project. In addition, proposed relocation of the Colonial pipeline, for few instances between M.P. 59.70 and M.P. 61.81, would actually be located within the limits of the aerial easement of the 500-kV PSE&G overhead electric transmission line (New Freedom-Deans Line). Because these encroachments would remain in accordance with the National Electric Safety Code for vertical clearance, there would be no impact.

Between Interchanges 8A and 9, it should be noted that a total length of approximately 2,600 linear feet of relocated Colonial pipeline would be the result of the construction of three extended stormwater detention basins at M.P. 75.1, M.P. 75.9, and M.P. 76.6 on the northbound side of the Turnpike.

Both the 16-inch and 36-inch Transcontinental (Transco) natural gas pipelines, as well as the 16-inch Sunoco petroleum pipeline, parallel either the northbound or southbound side of the Turnpike between M.P. 48.2 (Assiscunk Creek) and M.P. 56.90 (Crosswicks Creek, between Interchanges 7 and 7A). Because of their close proximity adjacent to the Turnpike, these pipelines would also be impacted and require relocation. Both the 16-inch and 36-inch Transco pipelines would respectively require an estimated 24,800 and 15,800 linear feet of relocated pipelines. An estimated 11,700 linear feet of relocated pipeline would be required for the 16-inch Sunoco petroleum pipeline. The Sunoco pump station, located on the northbound side of the Turnpike at M.P. 50.50, would also have to be relocated, while the Transco valve station located at M.P. 51.48 on the southbound side would not be impacted by the Proposed Project.

Both the 10-inch and 24-inch Texas Eastern gas pipelines, which parallel the northbound side of the Turnpike between M.P. 75.8 and M.P. 76.6 before crossing the roadway underground and running northwest away from the Turnpike, would also be impacted and require, respectively, 1,880 and 1,890 linear feet of relocated pipeline. It should be noted that these relocations would be due to the construction of two stormwater detention basins at M.P. 75.9 and M.P. 76.6 on the northbound side of the Turnpike.

Major Electric Transmission Facilities

Both of the PSE&G overhead electric transmission lines, the New Freedom-Deans Line (500-kV) and the Trenton-Burlington Line (132-kV), for the most part parallel the Turnpike between M.P. 48.2 and M.P. 65.52 and between M.P. 52.50 and M.P. 56.50, respectively. These high-voltage facilities would remain physically unaffected by the Proposed Project; however, several sections of the widened Turnpike's new right-of-way would be located within the limits of the aerial easements of these two lines. For example, at several locations where the outer roadway alignment diverges from the inner roadway to create the 70-foot wide median to allow for ramp connections at interchanges and service areas, the new roadway embankment would encroach into the existing aerial easements. According to the National Electric Safety Code, a minimum vertical clearance of 29.0 feet (for 500 kV facilities) and 21.0 feet (for 132 kV facilities) should be maintained between the catenaries and pavement surface. During the Proposed Project's preliminary design phase, all efforts were made in order to not violate these vertical clearances and avoid any impact.

Between M.P. 49.3 and M.P. 65.52 (Assiscunk Creek to Old York Road), where the PSE&G easements run parallel to the northbound side of the Turnpike, the existence of the abutting 30-inch Colonial and 16-inch Sunoco petroleum pipelines would require several proposed stormwater detention basins to be situated further east of the PSE&G transmission lines. During the preliminary design phase, such proposed siting was discussed with PSE&G to address the joint use of their aerial easement for stormwater management. PSE&G indicated that the joint use would probably be feasible as long as acceptable access for maintenance of the conductors and towers be provided. Typically a minimum 30-foot wide stone drive between the transmission towers is required to allow access to maintenance vehicles equipped with a 180-foot boom. As a result, the design of these detention basins took PSE&G roadway access into consideration.

All the local roadway crossings located between the southern project limit and Old York Road at M.P. 65.52, cross beneath the PSE&G New Freedom-Deans electric transmission line located adjacent to the Turnpike's northbound right-of-way line. Between M.P. 52.5 and M.P. 56.5, those same local roads also cross beneath the Trenton-Burlington Line. The proposed realignment of these local roadways (as

further discussed later in this section) would reduce the existing vertical clearance between the electrical conductors and pavement surface, but would still maintain a minimum vertical clearance of 29.0 feet and 21.0 feet for the 500-kV and 132-kV lines, respectively, in accordance with the National Electric Safety Code.

No impacts are expected to JCP&L's 34.5-kV, 230-kV, and 500-kV (Deans to Smithburg Line) overhead electric transmission lines that cross over the Turnpike at four locations between Interchanges 8 and 9.

Local Water, Sanitary, and Stormwater Facilities

While all water, sanitary sewer, and stormwater mains are considered "wet lines" (or carrying liquids) by the Authority, for the most part they are only permitted to cross the Turnpike beneath its roadway. Therefore, none of these utilities would have to be relocated. However, based on each utility requirement, it may be necessary to reinforce those utility crossings. Such reinforcement procedures involve the installation of reinforced concrete or steel pipes which surround and protect the mains and whose installation may require temporary service disruption.

Several additional utility impacts were identified. Among the most significant would be the relocation of approximately 5,415 linear feet of 16-inch water main and three sanitary pump stations. The 16-inch water main is operated by NJ American Water and is located parallel to the northbound side of the Turnpike between Cranbury Station Road (M.P. 70.48) and Cranbury-Half Acre Road (M.P. 71.26). The three existing sanitary sewer pump stations to be displaced and reconstructed are listed below:

- Sanitary Pump Station No. 7, located at M.P. 67.30 on the southbound side of the Turnpike, is operated by the East Windsor Municipal Utility Authority (EWMUA) and is connected to a 12-inch sewer force main and to a 27-inch ACP gravity sewer line.

- Sanitary Pump Station No. 10, located north of N.J. Route 33 at M.P. 67.92 on the southbound side of the Turnpike, is also operated by the EWMUA and is connected to an 8-inch ACP gravity sewer line.

- The Sanitary Pump Station currently under construction at Prospect Plains Road (M.P. 72.10) on the southbound side of the Turnpike is operated by Cranbury Township's Department of Public Works and is connected to a 6-inch sanitary force main.

Three other less significant impacts would include the relocation of the abutting 12-inch water main and 6-inch sewer main along the relocated Uncle Pete's Road (M.P. 58.10 and M.P. 58.40) as well as the relocation of the abutting 12-inch sanitary sewer force main located in the vicinity of the relocated Interchange 8 (M.P. 67.60).

Local Electric/Gas Distribution Facilities

Local electric and gas distribution facilities have been categorized together because these utilities are typically located together within the existing bridge structures at local road crossings. As summarized in Table 4.21, it is anticipated that 15 of these utility crossings, currently supported by bridge structures, would have to be relocated as part of the proposed local roadway overpass realignments over the widened Turnpike.

At several other locations, these local electric and gas utilities cross underneath the Turnpike, either along the underpasses of local roadways or directly under the Turnpike's roadway in underground casings. No relocation impacts are expected for those utilities, although some temporary and localized

service disruptions may be required for the reinforcement of underground gas lines that cross beneath the Turnpike.

Communication Facilities

Similarly to local electric and gas distribution facilities, communication utilities are typically permitted to cross the Turnpike within existing bridge structures. It is anticipated that 22 of these communication crossings, including fiber/coaxial telephone and television cables currently supported by bridge structures, would have to be relocated as part of the proposed local roadway overpass realignments over the widened Turnpike. At all other crossings, those telephone and television utilities cross underneath the Turnpike along the underpasses of local roadways and would thus not have to be relocated.

Between Interchanges 6 and 8A, the Authority's fiber optic line would be impacted by the Proposed Project, but the exact extent of its potential relocation will be further identified during the final design stage. Between Interchanges 8A and 9, the Authority's fiber optic line may be impacted by the construction of the third lane of the existing outer roadways. Of the two other fiber optic cables privately owned by either MCI/WorldCom and AT&T, approximately 1,800 linear feet of MCI/WorldCom's Lightnet cable would have to be relocated between M.P. 52.50 and M.P 53.00 near Interchange 7.

Transportation Facilities

There will be no impact to any of the roadway crossings between Interchanges 8A and 9 because these bridge structures have been constructed to accommodate the proposed third lane addition to the existing outer roadways. However, due to the proposed construction of the outer roadways between Interchange 6 and Interchange 8A, local roadways crossing over the Turnpike would require total structural replacement to span over the widened Turnpike. In addition, none of the three railroad crossings would be impacted from the Proposed Project.

Out of the 33 roadway crossings located between Assiscunk Creek and Interchange 8A, nine would not be impacted by the Proposed Project. These nine include the underpasses of three local roads, two county roads, N.J. Route 33 (a.k.a. Franklin Street) and U.S. Route 206, as well as the overpasses of N.J. Route 133 and N.J. Route 32. Both the westbound and eastbound spans of N.J. Route 133 (M.P. 68.35) and N.J. Route 32 (a.k.a. Forsgate Drive at M.P. 73.42) would not require any modifications as they already provide enough clearance for the proposed Turnpike outer roadways. Required traffic protection measures on these roadways during the construction of the expanded Turnpike roadway and shoulders would most likely result in some minor and temporary traffic disruption. The new outer roadways of the dualized Turnpike will span over these roads with appropriate horizontal and vertical clearances in accordance with the functional classification of each road. A vertical clearance of 16.5 feet is proposed over N.J. Route 33 in accordance with current NJDOT vertical clearance standards for state highways.

Due to the crossing angle of Hightstown-Cranbury Station Road and the adjacent inactive railroad (Conrail Shared Assets Operation's Hightstown Industrial Track) underneath the Turnpike between M.P. 69.90 and M.P. 70.48, required construction techniques are complex and may result in some traffic disruptions. The existing Turnpike's structure over these two transportation facilities is a two-span bridge with portions of the existing superstructure being supported by outriggers extending beyond the limit of the bridge fascia structure. This structural configuration creates difficulty in widening the existing bridge without impacting its structural integrity. The proposed outer roadway profiles have been designed to carry a new three-span structure over the existing local road, railroad and outriggers which would ultimately result in the raising of the outer roadway profiles by

approximately 11 feet in comparison to the inner roadways. While this height would be required to provide clearance for the existing outriggers and the required structure depth for the proposed bridge, it would probably increase the surface of construction staging areas and lengthen the construction phases which would hinder the maintenance and protection of traffic along the local road.

Of the remaining 24 roadways in this segment of the Project Corridor, Route I-195, along with 9 county roads and 14 local roads, would be impacted by the Proposed Project. At all of the local and county roadway crossings with the exception of Columbus-Hedding Road further discussed below, the roadways are proposed to be relocated adjacent to their existing alignments (either north or south) and the proposed realigned bridges (or offline bridges) would be lengthened to accommodate the new outer roadways of the dualized Turnpike. In some instances, and based on consultation with the roadway operator, the proposed realigned bridges could be improved by widening in order to accommodate future traffic projections. At this stage of the preliminary design, only the proposed realigned bridge of Prospect Plains Road (CR 614), crossing over the Turnpike at M.P. 72.10, is proposed to be widened in order to match the approach roadways which have recently undergone some widening improvements but did not extend across the existing bridge structure. Similarly, at the existing eastbound and westbound spans of Route I-195 at M.P. 60.60 and M.P. 60.70, respectively, the two existing bridges are proposed not only to be rebuilt online and lengthened to accommodate the southbound service road and the new outer roadways of the dualized Turnpike, but also improved by widening in order to accommodate the acceleration and deceleration lanes of the toll plaza. At the suggestion of NJDOT, the Route I-195 bridges would also be widened to the median to accommodate the addition of a future third lane.

In all situations mentioned above, the local and county bridges would be realigned with the exception of Columbus-Hedding Road (CR 678) at M.P. 50.95. At this location, an offline bridge replacement either to the north or the south of existing bridge would impact the existing eastbound and westbound PHMTE bridges over Columbus-Hedding Road as well as the northbound exit ramp from the Turnpike mainline to the PHMTE. As a result, an in-line and longer bridge is proposed to be constructed along the existing local roadway alignment. Since traffic along this lightly traveled road is minimal (with less than 60 vehicles forecast for the 2010 peak hour), a proposed detour during construction would have insignificant service impacts. According to the preliminary traffic management plans, the eastbound traffic on Columbus-Hedding Road will be diverted north on Old York Road (CR 660), east on Mansfield Road, and south on U.S. Route 206. Traffic from U.S. Route 206 intending to go west on Columbus-Hedding Road will be diverted north on U.S. Route 206, west on Hedding-Mansfield Road and south on Old York Road. The total length of this detour route would be 3.2 miles, compared to the current 2.4-mile distance without the detour. Therefore, the proposed detour would only have an increased travel distance of 0.8 mile, which in turn would only add 1.6 minutes to emergency response times, assuming an average travel speed of 30 mph for emergency vehicles.

It should be noted that two abutting local roads included in the above total, Uncle Pete's Road (M.P. 58.10 through 58.40) and Breshanan Road (M.P. 62.86 through 63.0), would also be impacted by the Proposed Project. In total, approximately 2,300 linear feet of abutting roadways would have to be relocated.

4.14.4.2 Operational Impacts

No operational impacts are anticipated to result to any of the major petroleum and natural gas transmission pipelines, major electric transmission facilities, local water/sanitary/stormwater facilities, local electric and gas distribution facilities, or to any of the communication and transportation facilities.

As discussed in Section 4.15.4.2 (Solid Waste Operational Impacts), increased utility demand resulting from increased usage at the four service areas in the Project Corridor can be related to the projected

increase in traffic in the No-Build and Build conditions. As a result, utility demand for build conditions, when compared to No-Build conditions, could be expected to increase from between 5.3 percent and 18.7 percent in the year 2012 and between 13.4 percent and 33.7 percent in the year 2032, depending on the service area. Given typical daily usage rates, such increases in utility demand are considered manageable and are therefore not expected to have any significant adverse impacts to local utilities.

4.14.5 Mitigation of Impacts

Mitigation of utility impacts should include a consultation and review of the preliminary design plans with the specifically affected utility operators. Further coordination with the owners of the major pipelines and electric transmission lines should occur to discuss the potential mitigation measures to their impacted facilities. Consequently, any required relocations, adjustments, or modifications to utilities would be soundly integrated into schedules and budgets as appropriate, to avoid any detrimental and unnecessary disruptions to customers and to ensure that construction can proceed with limited and temporary interruptions.

Currently, the preliminary design plans do not require the relocation of any electric transmission lines, but they do require the construction of embankment slopes, stormwater detention basins and pipeline relocations within the limits of the PSE&G aerial easement. The preliminary design plans will be reviewed with representatives of PSE&G in order to solicit concurrence with proposed construction within their easement areas. In the event that any potential impacts to overhead electric transmission lines should be identified at a later stage of project design, the following restrictions should be taken into consideration:

4.14.5.1 PSE&G 500 kV New Freedom – Deans Transmission Line

A two-year timeframe is required to schedule outages and complete construction of any relocation. Nuclear generating stations that are owned and operated by PSE&G are connected to the Pennsylvania-Jersey-Maryland (PJM) grid by the 500 kV transmission system. Circuit 5021 of that 500 kV system runs parallel to the New Jersey Turnpike in the Project Corridor. Circuit 5021 is one of the most critical circuits in the PJM grid system for maintaining system stability at the Salem and Hope Creek nuclear generating stations in New Jersey. In the event of a blackout, the Nuclear Regulatory Commission (NRC) requires that an off-site power source be utilized to protect critical nuclear safety systems at the Salem and Hope Creek generating stations in order to protect the health and welfare of the public from potential radiation hazards. Circuit 5021 is a primary off-site power source to the Salem and Hope Creek stations. An outage of the 5021 circuit also reduces the amount of power output that Salem and Hope Creek can deliver to the PJM grid. The deficiency caused by this reduction is made up by running more expensive and less environmentally friendly generation resources. In addition, an outage of the 5021 circuit reduces the amount of Available Transmission Capability (ATC) that the PJM can utilize to economically and reliably transfer power in the energy market.

4.14.5.2 PSE&G 132 kV Trenton-Burlington Transmission Line

A three-month notification is required for outages, and outages are not permitted between May and September.

4.14.5.3 JCP&L 34.5 kV Transmission Line

A three-month notification is required for outages, and outages are not permitted between May and September.

4.14.5.4 Underground Pipelines

A consultation effort with pipeline companies should also be convened to discuss the significant lengths of pipeline relocations required by the preliminary design plans. The meetings would not only introduce those companies to the Authority's plans for implementing early pipeline relocations as right-of-way may become available, but also help identify strategies for early utility company contractual requirements necessary to order long lead time materials. The utility company process for preparing construction contract documents and bidding the contract among pre-qualified pipeline construction companies could also be discussed. In any event, it is recommended that the currently known and following restrictions should be adhered at a minimum:

Sunoco petroleum pipeline: Relocation schedule requires coordination with third party supply requirements.

Colonial petroleum pipeline: Outages can only occur during the spring and fall of the year.

Transcontinental gas pipeline: Outages can only occur during the spring and fall of the year.

Whenever feasible, the required reinforcement to any existing utility crossings (either above- or below-ground infrastructures not to be relocated) should be conducted by utilizing casing techniques that would not require the dismantlement and therefore service interruption of the utility. At a minimum temporary service interruption should be scheduled outside utility's peak use periods or seasons.

Finally, any required relocations, adjustments, or modifications to utilities should be performed in accordance to Authority's policies and administrative procedures as stated in Section 13 of the *NJTA Design Manual* in order to improve cost sharing and betterment opportunities.

4.14.6 Summary

Table 4.28 summarizes the required relocations to major utilities. While those segmental relocations extend all along the proposed lines of the Turnpike's widened right-of-way, it is anticipated that proper planning and coordination effort with the respective utility operators will prevent significant adverse impacts to customers through limited and temporary service disruptions or interruptions. All improvement opportunities rather than in-kind replacement to those relocated infrastructures would be maximized based upon thorough consultation and appropriate cost allocation agreements between the Authority and the affect utility operators. Potential utility impacts associated with the siting of stormwater detention basins would be minimal.

Overall there will no reduction in the number of roads crossing over the Turnpike. While potential detour routes have been identified for all local and county bridge crossings, the major anticipated impacts would only be in the form of minor local traffic disruption during the construction period, insofar as all relocated bridges will be in operation before the old bridges are removed. Even though construction of Columbus-Hedding Road would be the only required implementation of a detour route, potential impacts to vehicle miles traveled and emergency vehicle response time would be insignificant.

4.15 Solid Waste

4.15.1 Introduction

Large-scale projects such as major highway widening and bridge reconstruction/replacement have the potential to generate a substantial amount of solid waste during construction. In addition, a widened

Table 4.28
Summary of Major Utility Relocations by Utility Companies

Utility	Linear Feet of Anticipated Relocation
36-inch Transcontinental Gas Line	15,800
16-inch Transcontinental Gas Line	24,800
30-inch Colonial Petroleum Line	68,595
16-inch Sunoco Petroleum Line	11,700
24-inch Texas Eastern Gas Pipeline	1,890
10-inch Texas Eastern Gas Pipeline	1,880
Fiber Optic (MCI)	1,800
16-inch Water Main	5,415

highway may have the potential to increase the volume of solid waste generated at its service areas due to an increased level of usage.

4.15.2 Data Sources and Methodology

For the purpose of evaluating construction impacts, the volume of solid waste generated from land clearance, demolition, and construction activities was estimated in order to not only assess this volume's effect on the capacity of existing facilities that process construction debris, but also to evaluate transportation options/routes to these disposal facilities. For the purpose of evaluating operational impacts, the volume of solid waste generated from the operations of an expanded Turnpike was also estimated in order to assess the permanent impact, if any, of any additional solid waste generation on the current disposal systems located in the Project Corridor. In cases where more than de minimis volumes of solid waste are generated, future solid waste disposal practices, including the status of landfilling and resource recovery plants in the state, was documented and evaluated for compliance with NJDEP solid waste and recycling regulations. The Solid Waste Management Plans of Middlesex, Mercer, and Burlington Counties have been reviewed to further evaluate potential impacts and compliance of construction and operational activities. Finally, all practicable options to minimize solid waste generation from the Proposed Project were identified.

4.15.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration. Although traffic volume would continue to increase, along with an associated increase in solid waste being generated at the service areas, this increase is not considered to be significant (See Section 4.15.4.2 below). Consequently, there would be no impact to local or county solid waste programs.

4.15.4 Proposed Project Impacts

4.15.4.1 Construction Impacts

A certain volume of solid waste associated with construction and demolition debris would be generated by clearing and grubbing, structural demolition and other construction activities that would take place along the Project Corridor. All demolition and construction activities will be performed in compliance with the directions, provisions, and requirements outlined in the Authority's *Standard Specifications* (2004). These activities will include clearing and grubbing, roadway/channel/foundation/trench

excavation, temporary/permanent soil erosion and dust control, subgrading, demolition of existing structures, and temporary fencing. For example, the demolition of existing bridges will include the removal of superstructure, abutments, piers, retaining walls, foundations and footings, and all other above-ground portions of the structures, which will then be disposed of at appropriate disposal sites. These materials are considered to be short-term and would be confined to the vicinity of the roadway construction area as well the construction areas for the proposed stormwater detention basins and the relocation of any impacted utility infrastructure (i.e., pipelines). The disposal of these materials would be done in accordance with the solid waste management plans of Burlington, Mercer, and Middlesex Counties and in compliance with the *Solid Waste Management Act* (N.J.S.A. 13:1 E-1), and implementing regulations at N.J.A.C. 7:26.

According to NJDEP's Division of Solid and Hazardous Waste, construction and demolition debris are defined as solid waste Type 13C, which includes building and structural material and rubble resulting from construction, remodeling, repair, and demolition operations on houses, commercial buildings, pavement and other structures. The following materials may be found in construction and demolition waste: treated and untreated wood scrap; tree parts, tree stumps and brush; concrete, asphalt, bricks, blocks, and other masonry; plaster and wallboard; roofing materials; corrugated cardboard and miscellaneous paper; ferrous and nonferrous metal; non-asbestos building insulation; plastic scrap; dirt; carpets and padding; glass (window and door); and other miscellaneous materials; but does not include other solid waste types. The two Class I sanitary landfills located in the vicinity of the Project Corridor, the Burlington County Resource Recovery Complex (BCRRC) and the Middlesex County Landfill, are both accepting Type 13C wastes and have sufficient remaining capacity and life expectancy that are anticipated to last beyond 2012. As a result, construction and demolition wastes resulting from the Proposed Project are not expected to have a significant adverse impact to these landfill operations and other local solid waste disposal operations. In addition, the BCRRC indicated that contaminated soils, as long as they don't consist of clay or hazardous materials, could be used for landfill cover and would therefore be a beneficial impact.

It is anticipated that a large amount of construction and demolition debris resulting from the Proposed Project would classify as Class B recycling materials. A review of the nearest Class B recycling facilities to the Project Corridor (as listed in Table 4.28) indicates five facilities in Burlington County, five in Mercer County, and twelve in Middlesex County that are processing several authorized types of construction and demolition debris. These materials, as listed in Table 4.29, are expected to be generated by the Proposed Project, and include asphalt, asphalt-based roofing materials, brush, brick and block, concrete, petroleum-contaminated soil, wood, tree parts, trees, and tree stumps. While most of those facilities have been operating between 6.3 percent and 59.2 percent of their permitted capacity as of 2002, they should be able to accommodate and adequately process any generated volume of recycle waste materials that would have not been reused onsite during construction. According to N.J.A.C. 7:26A, the tonnage of demolition and construction debris being recycled will be reported to the respective Solid Waste Management District of origin. Therefore, the Proposed Project would be consistent with the state's goals on recycling and would not have any significant adverse impact to local recycling facilities.

4.15.4.2 Operational Impacts

Upon completion of the Proposed Project, operations are expected to basically remain identical to their current conditions. There will be no additional maintenance facilities constructed along the Project Corridor since Maintenance District Nos. 3 and 4, as well as the Central Shops, will continue to operate at the same level, with no planned expansion. The widened Turnpike will minimally increase the surface area of landscaping activities which could typically be a large source of vegetative waste (defined as solid waste Type 23 by NJDEP). Additional median and infield areas will require mowing; however, landscaping activities such as tree care (thinning, trimming, and removal), soil stabilization,

Table 4.29
List of Class B Recycling Facilities Processing Authorized Construction and Demolition Waste Materials within the Respective Solid Waste Management Districts along the NJ Turnpike Project Corridor

Facility Name and Address	County	NJDEP ID	Materials Processed	Capacity	Total Volume Utilized (2002) (1)	% Capacity Utilized (2002) (2)
Burlington County Landfill Burlington-Columbus Road Mt. Holly, NJ 08060	Burlington	131962	B, TRS, TP, TS, W	500 tpd	26,622 tons	17.7%
Herman's Trucking, Inc. 181 Jacobstown-Cookstown Rd Wrightstown , NJ 08562	Burlington	131974	A, B, B&B, C, TRS, TP, TS	1,748 tpd	77,906 tons	6.3%
Mimlitsch Entreprises, Inc. 151 New Road Evesham, NJ 08053	Burlington	0313001513	B, TP, W	50 tpd	3,802 tons	25.3%
Sta Seal Maple Ave. Kingston, NJ 08528	Burlington	0317001166	A, B&B, C	2,000 tpd	77,906 tons	13.0%
Winzinger Inc. 1704 Marne Highway Hainsport, NJ 08036	Burlington	241302	A, B&B, C	n/a	n/a	n/a
Hamilton Township Kuser Road Hamilton, NJ 08650	Mercer	1103001531	A, B, C, W	175 tpd	11,098 tons	21.1%
Mercer Group International Calhoun Street Trenton, NJ 08625	Mercer	132273	A, B&B, C, W	2,350 tpd	159,088 tons	22.6%
Mid-Jersey Mulch Prdts. 227 Bakers Basin Road Lawrenceville, NJ 08648	Mercer	132289	TRS, TP, TS, W	600 tpd	42,965 tons	23.9%
Trap Rock Industries 2485 East State St. Hamilton, NJ 08619	Mercer	132282	A, B&B, C	n/a	n/a	n/a
Vinch Recycling 2 Vinch Avenue Trenton, NJ 08638	Mercer	132272	A, ABRM, B&B, C, W	650 tpd	11,098 tons	21.1%

Table 4.29 (Continued)
List of Class B Recycling Facilities Processing Authorized Construction and Demolition Waste Materials within the Respective Solid Waste Management Districts along the NJ Turnpike Project Corridor

Facility Name and Address	County	NJDEP ID	Materials Processed	Capacity	Total Volume Utilized (2002) (1)	% Capacity Utilized (2002) (2)
Bayshore Recycling Corp 75 Crows Mill Road Keasby, NJ 08832	Middlesex	1225001522	A, B&B, C, PCS	2,000 tpd	253,739 tons	36.6%
Clayton Block Route 1 Edison, NJ 08817	Middlesex	1205001200	A, B&B, C	800 tpd	37,496 tons	15.6%
Clean Earth of Carteret, Inc. 24 Middlesex Avenue Carteret, NJ 07008	Middlesex	132310	PCS	n/a	n/a	n/a
Dauman Recycling, Inc. Driftway Street Carteret, NJ 07008	Middlesex	132308	TRS, TS, W	600 tpd	46,806 tons	26.0%
Iron Leaf Meadow Road Edison, NJ 08812	Middlesex	1205001317	B, TRS, TP, TS, W	500 tpd	20,251 tons	13.5%
J.H. Reid 172 Baekeland Avenue S. Plainfield, NJ 07080	Middlesex	132339	B, TRS, TP, TS, W	250 tpd	36,995 tons	59.2%
JNC Materials, Inc. 340 Roosevelt Ave. Edison, NJ 08837	Middlesex	132309	A, B&B, C	1,538 tpd	226,272 tons	49.0%
Odaco, Inc. 234 Broadway Rd. Cranbury, NJ 08512	Middlesex	132312	B, TP, TS, W	300 tpd	15,241 tons	16.9%
Reclamation Technology, Inc. 3200 Bordentown Avenue Parlin, NJ 08859	Middlesex	132331	W	300 tpd	18,278 tons (3)	20.3% (3)
South Brunswick Recycling U.S. Route 130 Monmouth Jct., NJ 08852	Middlesex	1221001413	A, B&B, C	1,000 tpd	109,744 tons	36.6%

Table 4.29 (Continued)
List of Class B Recycling Facilities Processing Authorized Construction and Demolition Waste Materials within the Respective Solid Waste Management Districts along the NJ Turnpike Project Corridor

Facility Name and Address	County	NJDEP ID	Materials Processed	Capacity	Total Volume Utilized (2002) (1)	% Capacity Utilized (2002) (2)
Stavola Old Bridge Materials 1 Waterworks Road Red Bank, NJ 07701	Middlesex	133594	A, B&B, C	1,200 tpd	33,958 tons	11.3%
Tilcon of NY Cross Mill Road Wharton, NJ 07885	Middlesex	132394	A, C	n/a	n/a	n/a

Recycled Materials Abbreviations:			**Capacity Abbreviation:**
A = Asphalt ABRM = Asphalt-Based Roofing Material B = Brush	B&B = Brick and Block C = Concrete PCS = Petroleum-Contaminated Soil (non-hazardous) W = Wood (unpainted, not chemically-treated)	TP = Tree Parts TRS = Trees TS = Tree Stumps	tpd = tons per day n/a = not available

(1) Drawn from the annual tonnage reports submitted by recycling facilities.
(2) Derived by dividing the calendar year utilization of each facility by an annualized capacity for the facility computed on the basis of 300 days of operation [note that some facilities operated 7 days per week (300 days) or 5 days per week (250 days)].
(3) The 2001 Data, whenever accessible, was used in instances where the 2002 Data was not available.

Sources:
- NJDEP's Division of Solid and Hazardous Waste, Database Search of New Jersey Approved Class B Recycling Facilities, March 2006. (http://www.nj.gov/dep/dshw/lrm/classbsch.htm)
- NJDEP's Division of Solid and Hazardous Waste, 2006 State Wide Solid Waste Management Plan, December 2005. (http://www.state.nj.us/dep/dshw/recycle/swmp/index.html)

and planting are expected to continue at their current levels along either side of the Turnpike's right-of-way. Based on future traffic projections, it is anticipated that litter removal along the roadway may increase proportionally, but this type of solid waste will continue to be processed in the same manner without having any significant adverse impact to local solid waste services.

While no new service areas are being proposed along the Project Corridor, a closer look at the existing facilities is warranted for the respective future volumes of solid waste at Service Areas 6S and 6N at M.P. 58.7, Service Area 7S at M.P. 71.7, and Service Area 8N at M.P. 78.7. Solid waste projections at these facilities are summarized in Table 4.30. These projections were derived from the projected future two-way Average Annual Daily Traffic (AADT) for the years 2012 and 2032. In the year 2012, solid waste volumes for build conditions at each facility, when compared to the no-build conditions, are expected to increase from 5.3 percent to 18.7 percent, with a total volume of 238.2 tons per year. In the year 2032, solid waste volumes for build conditions at each facility, when compared to the no-build conditions, are expected to increase from 13.4 percent to 33.7 percent, with a total volume of 675.4 tons per year. These volume increases appear relatively insignificant when compared to local volumes of currently generated municipal waste. For example, Service Area 7S, located in Cranbury, has the highest projected increase of solid waste for any of the two build year conditions (18.7 percent and 33.7 percent for 2012 and 2032, respectively). In comparison to the 48,791 tons of solid waste generated in 2003 in Cranbury Township, the increases of solid waste generated by Service Area 7S would be merely 0.003 percent for 2012 and 0.008 percent for 2032. As a result, it is anticipated that the projected solid waste volume associated with the increased customer usage at the Turnpike service areas would have no significant adverse impact to local solid waste collection services.

4.15.5 Mitigation of Impacts

While no significant adverse impacts to local and county solid waste programs are anticipated to result from the Proposed Project, some mitigation measures will be adopted for the construction and operational phases of the project. During construction activities, all applicable effort towards the beneficial reuse and recycling of waste material will be taken by the Authority in order to reduce construction and demolition debris entering the Class I sanitary landfills.

Whenever applicable, material reuse procedures will be performed during demolition and construction in order to maximize the recovery and recycling opportunities and to contribute toward the state's goal of a recycling rate of 65 percent of New Jersey's total solid waste stream. For example, prior to grading, clearing, and grubbing; the ground surface within the excavation area would be stripped of all sod and vegetative matter and any material which is suitable for conversion to topsoil. This topsoil material would then be stored for beneficial reuse as part of the Proposed Project whenever feasible. Any removed topsoil in excess of that required for the project will be stored at appropriate locations for future use by the Authority. Acceptable materials removed from stone fences, masonry walls, concrete, or timber structures from the bridges and footings, as well as concrete and bituminous pavement, will be broken up and reused for the construction of embankments. Only materials that are not suitable for embankments will be disposed of off-site, in compliance with all federal, state and local regulations. For example, the existing span and other metallic parts of the replaced bridges would be sold as scrap metal in accordance with applicable regulations. In addition, while burning will not be permitted, all wood material (i.e., trees, tree parts, brush) will either be chipped and stockpiled for beneficial reuse in areas to be reforested, or be disposed of off Turnpike property in accordance with applicable requirements.

When all feasible on-site beneficial reuse options have been exhausted, the recycling of various components of construction and demolition waste will be evaluated, rather than disposing of this material. For example, a survey conducted by NJDEP in April 2004 showed that recycling asphalt debris, concrete rubble, used bricks and concrete blocks, trees (parts and stumps) and wood scrap

Table 4.30
Solid Waste Volume Projections and Increases based on Traffic Volume Projections for the 2012 and 2032 Build Years

Service Area *Municipality (County)*	2005	2012						2032					
	Existing Conditions	No Build Conditions		Build Conditions				No Build Conditions		Build Conditions			
	Waste Volume (tons)	*Traffic Increase (%)*	Waste Volume (tons)	*Traffic Increase (%)*	Waste Volume (tons)	Waste Volume Increase from 2012 No-Build		*Traffic Increase (%)*	Waste Volume (tons)	*Traffic Increase (%)*	Waste Volume (tons)	Waste Volume Increase from 2032 No-Build	
						(tons)	(%)					(tons)	(%)
Richard Stockton (6S) *Hamilton Twp. (Mercer Co.)*	284.07	*13.6%*	322.89	*19.7%*	339.99	17.20	5.3%	*64.7%*	467.96	*91.5%*	543.86	75.90	16.2%
Woodrow Wilson (6N) *Hamilton Twp. (Mercer Co.)*	377.67	*13.6%*	429.14	*19.7%*	452.01	22.87	5.3%	*64.7%*	622.16	*91.5%*	723.07	100.91	16.2%
Molly Pitcher (7S) *Cranbury Twp. (Middlesex Co.)*	760.16	*13.5%*	863.13	*34.8%*	1,204.52	161.40	18.7%	*59.3%*	1,210.84	*113.0%*	1,619.20	408.37	33.7%
Joyce Kilmer (8N) *E. Brunswick Twp (Middlesex Co.)*	441.43	*13.3%*	500.36	*21.7%*	537.09	36.73	7.3%	*52.8%*	674.34	*73.2%*	764.55	90.21	13.4%

Note:
Traffic percentage increases where derived from the projected 2-Way Average Annual Daily Traffic (AADT) for the No-Build and Build conditions of the years 2012 and 2032 along the respective NJ Turnpike segments.
Traffic volumes are presented in Chapter 4.17 – *Traffic and Transportation*

typically costs significantly less than disposing of these materials as solid waste in regular Class I sanitary landfills. The major cost savings of this survey are highlighted below.

In New Jersey, there are over 100 NJDEP-approved Class B recycling facilities that process various components of the construction and demolition waste stream. According to NJDEP, Class B recyclable materials are defined as source-separated recyclable materials which are subject to Department approval prior to receipt, storage, processing or transfer at a recycling center in accordance with N.J.S.A. 13:1E-99.34b, and which includes the following:

Average Cost to Recycle in New Jersey:
Asphalt debris* - $5.70 per ton
Concrete rubble* - $4.85 per ton
Used bricks and blocks* - $5.49 per ton
Trees and stumps - $37.69 per ton
Wood scrap - $46.43 per ton
Average Cost of Disposal in New Jersey:
Over $75.00 per ton and can be as high as $98.00 per ton.
* Several recycling centers did not charge any fee for the receipt of these recyclable waste materials.

Source:
NJDEP Survey results based upon 63 respondents (April 2004).
http://www.state.nj.us/dep/dshw/recycle/builderinfo.htm

1. Source-separated, non-putrescible, waste concrete, asphalt, brick, block, asphalt-based roofing, scrap and wood waste;
2. Source-separated, non-putrescible, waste materials other than metal, glass, paper, plastic containers, corrugated and other cardboard resulting from construction, remodeling, repair and demolition operations on houses, commercial buildings, pavements and other structures;
3. Source-separated whole trees, tree trunks, tree parts, tree stumps, brush and leaves, provided that they are not composted;
4. Source-separated scrap tires; and
5. Source-separated petroleum contaminated soil.

Prior to construction, the Authority will assess the potential volume of solid waste to be generated and estimate the volume of construction and demolition debris to be recycled (once all beneficial reuse options have been exhausted). As part of this determination, the state's recycling regulations and local Class I disposal facilities and Class B recycling facilities will be consulted, not only for compliance and acceptance, but also to verify available capacity for such types of solid waste. During operational activities, the solid waste generated at each service area will continue to be compacted and separated between cardboard and other waste types.

4.15.6 Summary

Whenever appropriate, construction and demolition debris will be recycled for on-site beneficial reuse or will be transported away from the Turnpike for either recycling or ultimate disposal at the nearest Class B or Class I facility, respectively. Currently, several recycling facilities and landfills near the Project Corridor in Burlington, Mercer, and Middlesex Counties function at or below their permitted capacity. As a result, project-generated construction and demolition debris can be adequately

accommodated, especially given the temporary and short-term nature of such solid waste streams. Nevertheless, the amount of debris generated during project construction would need to be evaluated prior to construction on a case-by-case basis for recycling opportunities in order to prevent a significant amount of construction and demolition debris from entering the solid waste stream. The disposal of any construction and demolition debris inappropriate for recycling will be conducted in accordance with local solid waste management plans and in compliance with the regulations of the New Jersey Solid Waste Management Act. During operation, roadway maintenance and service area activities will maintain their current operational practices without creating a significant increase in solid waste. Consequently, the Proposed Project is not anticipated to generate a significant amount of solid waste and will have no significant adverse impact to the local solid waste services and ultimately to the solid waste stream in New Jersey.

4.16 Contaminated Materials

4.16.1 Introduction

This section presents a review and analysis of the Contaminated Materials Screening Study presented in Section 3.17 of this document with regard to any potential for impact that could result from the Proposed Project. The purpose of this analysis is to assess the potential for soil and groundwater contamination due to past or current land use activities located within the Project Corridor. Seventeen *Areas of Concern* (AOCs) have been identified as a result of the preliminary screening evaluation. Impacts from these AOCs, if any, could be locally concentrated or have a greater impact on a larger-scale. Local concentration typically remains within the vicinity of the point of discharge. Larger-scale impacts are typically discharges that migrate to an adjacent property via groundwater or soil gas. Proximity to an existing roadway, bridge and any proposed new roadway alignment is an important factor in determining potential for impact – the closer a given contaminated site is to a construction activity, the greater the potential for exposing the site and contaminating that section of the Project Corridor. AOCs located hydraulically upgradient of any construction activity with respect to groundwater flow have a greater potential to impact the Proposed Project. Conversely, those sites located downgradient of any construction activity with respect to groundwater flow are less likely to have an impact. The movement of soil gases through the subsurface is more difficult to predict because of both natural ecological conditions and manmade structures such as utility lines.

Many contaminants that enter the ground bind to soil particles, and therefore, are not likely to move far from the site where they originated. Others can dissolve in or travel with groundwater that passes beneath the source, thereby traveling to, or finding a pathway to, other properties or receptors nearby. Soil, soil gas, and groundwater can become contaminated as a result of past or current activities on nearby or adjacent properties. Many past and current industrial activities use, store, or generate contaminated materials that can be spilled, dumped, or buried nearby. Industrial activities can also result in contamination due to improper management of raw product and/or waste material. Subsurface soil, soil gas and groundwater contamination can remain undetected for many years. Excavation, earthmoving, dewatering, and other construction activities can, however, expose the contaminants, providing a pathway of exposure and introducing potential risk to construction workers and others nearby if such contaminants are not properly managed. In this way, construction of the Proposed Project might encounter contaminated soil, soil gas, and/or groundwater.

4.16.2 Data Sources and Methodology

The locations of the 17 AOCs were compared to the Proposed Project's preliminary design plans to identify areas of potential impact (i.e., ground disturbance on or near an AOC). Once identified, each AOC's type and extent of contamination were evaluated against the preliminary design plans to assess the potential for impact.

4.16.3 No-Build Alternative

Under the No-Build Alternative, the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration, with no land being acquired for project purposes and no construction activity taking place. As a result, the existing 17 AOCs would remain. As these properties are known to NJDEP as being potentially contaminated, each would likely be remediated eventually, if they have not been already. There would be no impact to these properties from any Turnpike-related activity.

4.16.4 Proposed Project Impacts

The 17 AOCs are largely comprised of current of former industrial land uses or Turnpike-owned facilities. Many of the industrial uses have been in the Project Corridor for over 35 years and were in operation when there were fewer environmental regulations, which may have led to soil and/or groundwater contamination from these operations over time. Impacts to the 17 AOCs are discussed below by Turnpike segment.

4.16.4.1 Assiscunk Creek to Interchange 6

There are no AOCs located between Assiscunk Creek and Interchange 6.

4.16.4.2 Interchange 6 to Interchange 7

There are no AOCs located between Interchange 6 and Interchange 7.

4.16.4.3 Interchange 7 to Interchange 7A

There are three AOCs located between Interchanges 7 and 7A, as discussed below.

AOC 1 – Maintenance District No. 3

The Maintenance District No. 3 site, a Turnpike maintenance facility located at M.P. 56.5 on the northbound side of the Turnpike, has experienced petroleum discharges from its underground storage tank (UST) systems that have impacted soil and groundwater quality. A 3,000-gallon heating oil UST located on the west side of the building, and adjacent to the Turnpike, has been removed; however, residual petroleum soil and groundwater contamination remain on the site.

Construction activity associated with the Proposed Project would extend ground disturbance into the Maintenance District No. 3 property along the western periphery, from the Turnpike mainline widening; and along the southern periphery, from the realignment of the Ward Avenue overpass. Proposed construction will result in a new access driveway connecting to the northbound outer roadway and the realigned maintenance roadway connecting to the Turnpike's southbound outer roadway, the construction of a stormwater detention basin on the Turnpike's northbound side; and the realignment of the Ward Avenue overpass. Because residual soil and groundwater contamination remains on the site, construction activity could potentially impact contaminated areas.

AOC 2 – Woodrow Wilson Service Area 6N

Service Area 6N is a Turnpike service facility located at M.P. 58.7, on the northbound side of the Turnpike. The site has experienced petroleum discharges from its UST systems that have impacted soil

and groundwater quality. Limited remedial actions have occurred over time, including the removal of approximately 109,000 gallons of free product/groundwater from excavations during UST upgrades and free product recovery efforts via hand bailing and passive skimmer oil pumps from on-site monitoring wells.

Construction activity associated with the Proposed Project would extend the Turnpike northbound mainline to the east, closer to Service Area 6N. This work would also include realignment of the access and egress ramps. As a result, the new northbound outer roadway will be located closer to the fuel pumping islands and USTs, the major source of contamination discharge identified on the site, as well as to the south and east. A natural surface water receptor is located down-slope to the south, which during construction could be impacted.

AOC 3 – Richard Stockton Service Area 6S

Service Area 6S is a Turnpike service facility located at M.P. 58.7, on the southbound side of the Turnpike. Petroleum discharges from its UST systems have impacted soil and groundwater quality. Additionally, a sewage treatment plant formerly existed in the southwestern portion of the site.

Multiple UST systems over time have discharged petroleum products, resulting in soil and groundwater contamination. Over the past two decades, remedial investigations have been conducted on the site that have resulted in various mitigation treatments to minimize the impact of pollutants, such as a groundwater "pump and treat" systems to prevent the migration of dissolved phase contaminants, and a recovery system to treat contaminated groundwater. Remedial operations have been ongoing to date.

Construction activity associated with the Proposed Project will extend the Turnpike mainline to the west, closer to Service Area 6S. This work would also include realignment of the access and egress ramps. As a result, the new southbound outer roadway will be located closer to the fuel pumping islands and the UST field. Groundwater contamination is present at the former UST system and east of the current fuel pump islands, in the direction of the Turnpike mainline.

4.16.4.4 Interchange 7A to Interchange 8

There are three AOCs located between Interchanges 7A and 8, as discussed below.

AOC 4 – Unnamed Abandoned Farm

This site is located at the intersection of Walters and Gordon Roads near M.P. 62.3 on the northbound side of the Turnpike. An unknown number of abandoned containers holding various solid and liquid contaminants, including chlordane, were found on the site in the early 1990s.

Construction of the Proposed Project will extend the Turnpike mainline east towards Walters Road, including improving the intersection of Gordon Road and Walters Road. The property in question is located east of Walters Road. Because residual soil and groundwater contamination possibly remains on the site, construction activity could potentially impact contaminated areas.

AOC 5 – East Windsor Department of Public Works

The East Windsor Department of Public Works is located at the intersection of Ward Street and Etra Road, near M.P. 67.1 on the southbound side of the Turnpike. This site has had various petroleum product discharges from its UST systems; however these USTs were removed in 1996.

Construction of the Proposed Project will extend the Turnpike mainline into the property from the east and result in the demolition of four buildings on the site. Construction activity will also include the realignment of Etra Road, including improvements to the Etra Road and Ward Street intersection.

Based on the study of six monitoring wells located near the UST system, the site received a *Letter of No Further Action* from NJDEP based on a reduction of contamination levels below the state's groundwater quality criteria. As a result, it is not likely that there would be any potential impact at this site.

AOC 6 – Interchange 8 Toll Plaza

The toll plaza at Interchange 8 is located near M.P. 67.6 on the southbound side of the Turnpike. This site has had petroleum discharges from its UST systems that have impacted soil and groundwater quality. Discharges from UST's were discovered at the toll plaza upon removal of two 3,000-gallon No. 2 fuel oil tanks. In addition, a 290-gallon diesel UST was removed in 1995 and a discharge was discovered. A Letter of No Further Action was issued by NJDEP for this second discharge on October 29, 1996.

The Proposed Project will eliminate the existing toll plaza and associated ramps at its current location, to be replaced by ramps to the new relocated Interchange 8 toll plaza and access roadway to the Central Shops. Although the two UST's were removed from the toll plaza, the extent and magnitude of the soil and groundwater contamination remains unknown.

4.16.4.5 Interchange 8 to Interchange 8A

There are six AOCs located between Interchanges 8 and 8A, as discussed below.

AOC 7 – Central Shops

The Central Shops is a Turnpike facility located at M.P. 67.6 on the southbound side of the Turnpike adjacent to Interchange 8. This site has had petroleum discharges from its UST systems that have impacted soil and groundwater quality. The former USTs contained waste oil, heating oil, and unleaded gasoline and were removed from the site during the 1990s. Three unleaded gasoline USTs are currently in use at the site.

The Proposed Project will demolish a portion of the main building, adjacent parking lot and access driveway and replace them with access and egress ramps for the new relocated Interchange 8 toll plaza. The extent of contamination from the former USTs and the three discharges currently reported remain unknown.

AOC 8 – Elementis Specialties, Inc. / NL Industries

Elementis Specialties, Inc./NL Industries is an industrial facility located on Wycoff Mills Road near M.P. 68.5 on the northbound side of the Turnpike. This site has had petroleum discharges from its UST systems that have potential for impacting soil and groundwater quality. Previous investigations of the site have documented the on-site presence of six USTs (five containing No. 2 heating oil and one containing gasoline, and confirmed contamination near Tank No. 4); four above-ground storage tanks (ASTs, three containing propane, and one containing diesel fuel); a privately-owned wastewater treatment plant and discharge lines, and a hazardous waste storage area. In addition, according to NJDEP, Elementis Specialties, Inc./NL Industries disposed of solid waste and drums to the east of the waste treatment plant, but no information is available on the waste removal or drums disposal.

The Proposed Project would extend construction activity into the property from both the Turnpike mainline widening and new U-turn ramp and the Wyckoff Mills Road overpass realignment.

AOC 9 – Plant Food Company, Inc.

The Plant Food Company, Inc. is located at 38 Hightstown-Cranbury Station Road, near M.P. 69.1 on the southbound side of the Turnpike. A 4,000-gallon gasoline UST is located within 500 feet of the Turnpike at the center of the property. This UST has had petroleum discharges. The site also has one 1,000-gallon AST located within 220 feet of the Turnpike. A detention lagoon is also located within 200 feet of the Turnpike. Documents confirm the presence of soil contamination and remedial actions. Remedial actions included initial soil removal followed by an additional 115 tons of soil removal. Post-excavation sampling results have complied with soil cleanup criteria, although no Letter of No Further Action could be located during the NJDEP file review. The Proposed Project would not extend construction activity into this property.

AOC 10 – Former Unexcelled Chemical Corp. Site

The former Unexcelled Chemical Corp site is a vacant property located on Brickyard Road on the southbound side of the Turnpike near M.P. 69.5. The property formerly was the site of a manufacturer of military ordnance. A Preliminary Assessment conducted in 2000 confirmed the presence of unexploded ordnance on the property. The Proposed Project would not extend construction activity into this property.

AOC 11 – Former Carter-Wallace Site

The former Carter-Wallace site is an industrial facility located on Cranbury-Half Acre Road on the northbound side of the Turnpike near M.P. 71.1. The site has had numerous reported releases and spills from No. 2 fuel oil USTs as well as hazardous material discharges to a variety of destinations, including air, on-site soils, groundwater, Cedar Brook (located approximately 1/8 mile southeast of the site), and Cranbury Brook via storm drains.

The facility has six registered and two unregistered No. 2 fuel oil USTs. Although some USTs located within 500 feet of the Turnpike have soil and groundwater contamination, the extent of contamination remains unknown. Other potential areas of concern include retention basins, discharge lagoons, and sludge drying beds. A retention basin is located within 200 feet of the Turnpike.

The Proposed Project would extend into the property from the west (from the Turnpike mainline widening and the construction of a small stormwater detention basin, which would extend into the property by an additional 150 feet), and from the south (as a result of the realignment of the Cranbury-Half Acre Road overpass). The Proposed Project would extend the Turnpike mainline to less than 70 feet from the existing retention basin.

AOC 12 – Molly Pitcher Service Area 7S

Service Area 7S is a Turnpike service facility located at M.P. 71.6, on the southbound side of the Turnpike. This site has had petroleum discharges from its UST systems that have impacted soil and groundwater quality. On-site soil and groundwater remedial systems have been in place for years, including air sparging and soil vapor extraction. The groundwater in the water table is believed to flow in a westerly direction, away from the Turnpike.

The Proposed Project would extend into Service Area 7S from the east, as a result of the Turnpike mainline widening and the realignment of the southbound inner and outer ramps providing access and egress to the service area, and from the south, as a result of the realignment of the State Police U-turn.

AOC 13 – Former General Foods Site

The former General Foods site was located on Prospect Plains Road on the northbound side of the Turnpike near M.P. 72.2. Several discharges from USTs have occurred at the site and soil and groundwater contamination has been reported to NJDEP; however, the extent remains unknown.

Based on an available site map, one 280-gallon UST was located approximately 300 feet from the Turnpike. The entire site had eight USTs ranging from 200 to 30,000 gallons, including underground waste oil pipelines, oil waste manholes, and catch basins connected to an oil-water separator.

The Proposed Project would extend into the former General Foods property from the west with the Turnpike mainline widening.

4.16.4.6 Interchange 8A to Interchange 9

There are five AOCs located between Interchanges 8A and 9, as discussed below.

AOC 14 – Former BASF Wyandotte Facility

The former BASF Wyandotte plant was located at 1065 Cranbury-South River Road on the southbound side of the Turnpike near M.P. 74.5. All on-site buildings have recently been demolished and the site has been cleared. This site has had several petroleum and pesticide discharges that have potentially impacted soil and groundwater quality. The Proposed Project would not extend construction activity into this property.

AOC 15 – Former JIS Landfill

The former Jones Industrial Services (JIS) landfill is located on Cranbury-South River Road on the northbound side of the Turnpike near M.P. 75.0. In 1983, the site was placed on the National Priorities List (Superfund). A NJDEP Remedial Investigation and Feasibility Study (RI/FS) revealed that contaminated groundwater was migrating off-site, and that contamination is present in two distinct plumes emanating from the site. The primary plume extends approximately 2,000 feet to the southeast of the site and contains elevated levels of metals and VOCs, while a secondary plume exists approximately 5,000 feet southeast of the site and extends approximately 8,500 to the southeast toward Manalapan Brook. The Proposed Project would not extend construction activity into this property.

AOC 16 – Joyce Kilmer Service Area 8N

Service Area 8N is a Turnpike service facility located at M.P. 78.7, on the northbound side of the Turnpike. This site has had petroleum discharges from its UST systems that have impacted soil and groundwater quality. The Proposed Project would realign the northbound outer roadway ramp accessing Service Area 8N. Because residual soil and groundwater contamination remains on the site, construction activity could potentially impact contaminated areas.

AOC 17 – Maintenance District 4

Maintenance District 4 is a Turnpike maintenance facility located at M.P. 80.8 on the southbound side of the Turnpike. This site has had petroleum discharges from its UST systems. However, NJDEP has

issued a No Further Action letter for these discharges. The Proposed Project would not extend construction activity into this property.

AOC 18 – Transfer Print Foils, Inc.

Transfer Print Foils, Inc. (also known as ITW Holopak) is located at 9 Cotters Lane on the northbound side of the Turnpike near M.P. 81.2. Petroleum and chemical discharges have impacted the soil and groundwater quality on the site. The Proposed Project would not extend construction activity into this property.

4.16.5 Mitigation of Impacts

Several sites in the Project Corridor have the potential to contain contaminated soils, groundwater or both. Further investigations should be conducted to confirm the presence of contaminants in areas to be disturbed by construction activity. If these investigations reveal the presence of contaminated materials, the measures discussed below should be implemented prior to and during construction. Standard remediation measures exist for all of the substances likely to be encountered. Therefore, by implementing such measures, adverse impacts would be avoided or mitigated.

The measures to be implemented would be coordinated with NJDEP and include the following:

- Further investigations to be undertaken to better delineate the nature and extent of contamination in areas where the Proposed Project might encounter it; and

- Remediation measures to be undertaken before or during construction to remove or contain contaminated materials.

4.16.5.1 Further Investigations

During the final design phase, additional subsurface investigations should be undertaken in those portions of the 17 AOCs that might experience ground disturbance to delineate the nature and extent of contamination, if any. These investigations would generally include testing of soil and groundwater for a range of constituents. Borings would be advanced to the approximate depth of construction where excavation is required. Soil samples may be taken at a series of depths to determine the extent of any contamination. While the chemical analysis of the soil samples would vary depending upon the contaminant of concern, it would be expected that testing for metals, VOCs, SVOCs, PCBs, and pesticides would occur at most locations. In locations where contamination is identified either in the soil or groundwater, additional testing may be performed to further delineate the extent of contamination. The sampling plan would be designed to comply with the Technical Requirements for Site Remediation at N.J.A.C. 7:26E and approved by NJDEP prior to implementation.

4.16.5.2 Health and Safety Plans

Health and Safety Plans (HASPs) approved by NJDEP would be developed for the various construction activities associated with the Proposed Project to reduce the potential for worker or public contact with contamination found in either the soil or groundwater. These plans would address the potential exposure pathways and other safety concerns associated with a variety of construction activities. Each HASP would address both the known contamination issues (e.g., the need for air monitoring if excavating in known solvent contaminated soil) as well as contingency items (e.g., if unknown tanks are drums are encountered). Each HASP would be developed in accordance with U.S. Occupational Health and Safety Administration (OSHA) regulations and guidelines.

The HASP would be the primary measure used to safeguard construction workers and nearby residents during construction. This document would describe in detail all air, soil, and water sampling and monitoring that would take place during construction, planned response to monitoring data, personal protective equipment (PPE) to be used by workers in various parts of the excavation, dust and vapor control measures and emergency procedures. These procedures would include requirements to notify appropriate regulatory agencies as well as procedures to quickly and safely address the various issues. The HASP would also generally include routine monitoring of both air and soil (in place and/or as spoils).

The provisions of the Health and Safety Plan would be mandatory for the contractors and subcontractors engaged in any construction activities that have the potential to expose their personnel to the existing soils or groundwater on the construction site. In addition, all on-site personnel would be required to follow all applicable local, state, and OSHA codes and regulations.

4.16.5.3 Measures During or Prior to Construction

A Contaminated Materials Handling Plan approved by NJDEP would be developed to safely remove contaminated soils generally during, but potentially prior to, construction. This plan would include a HASP as well as procedures for stockpiling, testing, loading, transporting, and disposing of the material in accordance with all applicable regulations.

Potentially contaminated soils would be excavated and stockpiled until they could be tested and, if necessary, removed for off-site disposal at an appropriate facility. Although this is more costly than the disposal of non-contaminated soils, it is generally a rapid and relatively straightforward process. Depending on the quantities and locations of contaminated soils, other mitigation technologies may be used, such as soil vapor extraction for VOCs and capping for metal contamination. Capping would involve reusing soil on-site and covering it with at least 2 feet of clean soil or other appropriate material (e.g., asphalt paving). During construction, unusual conditions – such as odors or discoloration of the soil – that may indicate unexpected contamination would be checked for. Any contaminated materials encountered during construction would be handled, stored, and disposed of in accordance with all applicable federal, state, and local regulations.

4.16.5.4 Demolition of Structures

At locations where construction requires demolition of structures, a comprehensive asbestos survey of each structure would be conducted, including the sampling of all suspect materials to determine the presence or absence of asbestos containing materials (ACMs). Based on the findings of the survey, ACMs would be removed in accordance with all local, state, and federal regulations.

4.17 Traffic and Transportation

4.17.1 Introduction

This section of the EIS describes future conditions and potential impacts that could result from the Proposed Project as they relate to traffic and transportation facilities located within and near the Project Corridor.

4.17.1.1 Background

Projected future operational conditions in the Project Corridor were assessed to establish a No-Build condition that assumes no improvements would be made in the corridor, and a Build condition that assumes a full build out of the Proposed Project between Interchange 6 and Interchange 9. As part of

the development of No-Build and Build conditions, land use, population and employment growth and future proposed projects located within or near the Project Corridor were considered.

Traffic forecasts were developed for the year 2012 (Estimated Time of Completion - ETC), and the Build year 2032 (ETC + 20 years) for the Weekday AM, Weekday PM, Friday PM, and Sunday PM peak hours. Three future study scenarios relating to the Proposed Project were analyzed:

1. ***No-Build Condition*** **–** The Proposed Project would not be undertaken and the Turnpike would remain in its current configuration.

2. ***Build Condition*** **–** There are currently at least three travel lanes in each direction (six total) from just north of Assiscunk Creek through Interchange 9. Interchange improvements will be made as needed to accommodate future demand. The Proposed Project would increase this section of the Turnpike to a consistent six travel lanes in each direction (12 total).

3. ***Build Condition (With N.J. Route 92)*** **–** Assumes the same Turnpike widening as proposed in the Build Condition, but also assumes that the N.J. Route 92 connection is built (see Section 4.17.1.4).

In order to determine how the Proposed Project will perform, it was necessary to first develop a No-Build Condition that forecasts future conditions if no action is taken. The No-Build Condition provides the future baseline against which the two Build Condition alternatives can be evaluated. The No-Build Condition was developed using socioeconomic forecasts (i.e., population, employment) and the effect of "reasonably feasible" projects (i.e., a substantial commitment to construct them has been made).

4.17.1.2 Basis for Expected Growth

The forecasting process to determine future traffic growth and demand is based on an existing travel model that combines travel data supplied by two Metropolitan Planning Organizations (MPOs) – the Delaware Valley Regional Planning Commission (DVRPC) and the North Jersey Transportation Planning Authority (NJTPA). The travel data from these two MPOs comprise their most current planning assumptions and demographic growth estimates.

Tables 4.31 through 4.33 show existing (2005) and future year (2012 and 2032) county-level population, household, and employment projections derived from recent DVRPC and NJTPA forecasts. As shown in these tables, considerable growth in population and employment is projected over the next 30 years in New Jersey and southeastern Pennsylvania, particularly in the three Project Corridor counties. The population, number of households and employment are projected to grow at a higher rate in the three combined Project Corridor counties (highlighted in the tables) than in the region as a whole. During the 2005-2032 forecast period, the travel model projected a 1.5 to 2 percent per year traffic growth rate during peak travel hours in the No-Build Condition, and a nearly 2.5 percent per year growth in the Build Condition for the critical Turnpike mainline section between Interchanges 6 and 8A. The Project Corridor population and employment growth rates are projected to be 0.6 and 0.9 percent per year, respectively, during the same forecast period. The travel model also projected a 2.5 percent per year growth in long-distance auto traffic and 2 percent per year growth in long-distance truck traffic that feed into the modeled region.

These annual growth rates are consistent with the growth projections provided by Wilbur Smith Associates in their *New Jersey Turnpike Long Range Plan* (2004). In that report, Turnpike traffic is projected to grow by an average of 2.8 percent per year during a 15-year period (2005-2020), while New Jersey's population and employment was projected to grow by 0.7 and 0.9 percent per year, respectively during the same 15-year period.

Table 4.31
Existing and Future County-Level Population Projections
NJTPA and DVRPC Travel Model Counties

State	County	MPO	Population			% Growth/(Decline)	
			2005	2012	2032	2005-2012	2005-2032
NJ	Bergen	NJTPA	889,000	900,388	932,925	1.3	4.9
NJ	**Burlington**	**DVRPC**	**441,407**	**466,622**	**538,667**	**5.7**	**22.0**
NJ	Camden	DVRPC	509,012	510,585	515,078	0.3	1.2
NJ	Essex	NJTPA	801,487	819,809	872,160	2.3	8.8
NJ	Gloucester	DVRPC	269,075	287,774	341,201	6.9	26.8
NJ	Hudson	NJTPA	617,902	638,731	698,243	3.4	13.0
NJ	Hunterdon	NJTPA	129,238	146,213	194,714	13.1	50.7
NJ	**Mercer**	**DVRPC**	**355,542**	**367,883**	**403,141**	**3.5**	**13.4**
NJ	**Middlesex**	**NJTPA**	**763,450**	**794,483**	**883,149**	**4.1**	**15.7**
NJ	Monmouth	NJTPA	628,477	659,336	747,507	4.9	18.9
NJ	Morris	NJTPA	478,558	498,102	553,942	4.1	15.8
NJ	Ocean	NJTPA	521,804	547,209	619,796	4.9	18.8
NJ	Passaic	NJTPA	487,467	483,816	473,384	(0.7)	(2.9)
NJ	Somerset	NJTPA	303,468	317,417	357,270	4.6	17.7
NJ	Sussex	NJTPA	150,791	166,267	210,484	10.3	39.6
NJ	Union	NJTPA	522,964	524,003	526,979	0.2	0.8
NJ	Warren	NJTPA	106,357	115,508	141,653	8.6	33.2
PA	Berks	RATS*	13,116	13,927	16,243	6.2	23.8
PA	Bucks	DVRPC	627,724	669,849	790,204	6.7	25.9
PA	Chester	DVRPC	458,259	492,906	591,896	7.6	29.2
PA	Delaware	DVRPC	549,683	546,455	537,231	(0.6)	(2.3)
PA	Montgomery	DVRPC	768,920	796,838	876,606	3.6	14.0
PA	Philadelphia	DVRPC	1,514,039	1,509,125	1,495,086	(0.3)	(1.3)
Total Region			**11,907,738**	**12,273,246**	**13,317,559**	**3.1**	**11.8**
3 Study Area Counties			**1,560,399**	**1,628,988**	**1,824,957**	**4.4**	**17.0**

** Berks County is part of the Reading Area Transportation Study (RATS) MPO. However, the DVRPC travel model includes 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.*

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

Table 4.32
Existing and Future County-Level Household Projections
NJTPA and DVRPC Travel Model Counties

State	County	MPO	Population			% Growth/(Decline)	
			2005	2012	2032	2005-2012	2005-2032
NJ	Bergen	NJTPA	334,559	343,314	368,329	2.6	10.1
NJ	**Burlington**	**DVRPC**	**159,719**	**167,248**	**188,759**	**4.7**	**18.2**
NJ	Camden	DVRPC	185,009	184,644	183,599	(0.2)	(0.8)
NJ	Essex	NJTPA	288,733	300,504	334,021	4.1	15.7
NJ	Gloucester	DVRPC	95,249	100,884	116,982	5.9	22.8
NJ	Hudson	NJTPA	235,847	248,210	283,533	5.2	20.2
NJ	Hunterdon	NJTPA	46,599	52,991	71,254	13.7	52.9
NJ	**Mercer**	**DVRPC**	**127,953**	**133,216**	**148,254**	**4.1**	**15.9**
NJ	**Middlesex**	**NJTPA**	**272,721**	**288,794**	**334,716**	**5.9**	**22.7**
NJ	Monmouth	NJTPA	232,672	252,396	308,749	8.5	32.7
NJ	Morris	NJTPA	173,891	183,661	211,575	5.6	21.7
NJ	Ocean	NJTPA	208,039	225,862	276,785	8.6	33.0
NJ	Passaic	NJTPA	165,473	169,263	180,092	2.3	8.8
NJ	Somerset	NJTPA	111,938	118,826	138,506	6.2	23.7
NJ	Sussex	NJTPA	53,268	58,944	75,162	10.7	41.1
NJ	Union	NJTPA	187,380	190,329	198,759	1.6	6.1
NJ	Warren	NJTPA	40,701	45,464	59,075	11.7	45.1
PA	Berks	RATS*	5,169	5,400	6,060	4.5	17.2
PA	Bucks	DVRPC	229,299	244,075	286,293	6.4	24.9
PA	Chester	DVRPC	167,031	179,859	216,509	7.7	29.6
PA	Delaware	DVRPC	205,853	205,211	203,376	(0.3)	(1.2)
PA	Montgomery	DVRPC	294,300	305,754	338,481	3.9	15.0
PA	Philadelphia	DVRPC	590,643	591,429	593,677	0.1	0.5
Total Region			**4,412,088**	**4,596,280**	**5,122,545**	**4.2**	**16.1**
3 Study Area Counties			**560,393**	**589,258**	**671,729**	**5.2**	**19.9**

** Berks County is part of the Reading Area Transportation Study (RATS) MPO. However, the DVRPC travel model includes 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.*

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

Table 4.33
Existing and Future County-Level Employment Projections
NJTPA and DVRPC Travel Model Counties

State	County	MPO	Population			% Growth/(Decline)	
			2005	2012	2032	2005-2012	2005-2032
NJ	Bergen	NJTPA	462,655	488,177	561,098	5.5	21.3
NJ	**Burlington**	**DVRPC**	**212,143**	**225,585**	**263,992**	**6.3**	**24.4**
NJ	Camden	DVRPC	226,378	239,601	277,383	5.8	22.5
NJ	Essex	NJTPA	367,499	381,572	421,783	3.8	14.8
NJ	Gloucester	DVRPC	104,103	110,594	129,141	6.2	24.1
NJ	Hudson	NJTPA	253,449	275,213	337,396	8.6	33.1
NJ	Hunterdon	NJTPA	60,347	71,132	101,946	17.9	68.9
NJ	**Mercer**	**DVRPC**	**227,292**	**242,204**	**284,812**	**6.6**	**25.3**
NJ	**Middlesex**	**NJTPA**	**438,388**	**473,384**	**573,372**	**8.0**	**30.8**
NJ	Monmouth	NJTPA	240,561	259,030	311,801	7.7	29.6
NJ	Morris	NJTPA	284,057	312,095	392,203	9.9	38.1
NJ	Ocean	NJTPA	144,929	161,904	210,405	11.7	45.2
NJ	Passaic	NJTPA	183,521	184,094	185,732	0.3	1.2
NJ	Somerset	NJTPA	190,109	220,701	308,107	16.1	62.1
NJ	Sussex	NJTPA	40,168	44,004	54,965	9.6	36.8
NJ	Union	NJTPA	261,141	273,962	310,594	4.9	18.9
NJ	Warren	NJTPA	39,576	43,044	52,955	8.8	33.8
PA	Berks	RATS*	6,951	7,472	8,959	7.5	28.9
PA	Bucks	DVRPC	281,371	301,317	358,306	7.1	27.3
PA	Chester	DVRPC	255,611	279,370	347,254	9.3	35.9
PA	Delaware	DVRPC	244,509	253,392	278,773	3.6	14.0
PA	Montgomery	DVRPC	510,948	536,527	609,611	5.0	19.3
PA	Philadelphia	DVRPC	761,167	788,846	867,928	3.6	14.0
Total Region			**5,796,872**	**6,173,222**	**7,248,616**	**6.5**	**25.0**
3 Study Area Counties			**877,823**	**941,173**	**1,122,176**	**7.2**	**27.8**

** Berks County is part of the Reading Area Transportation Study (RATS) MPO. However, the DVRPC travel model includes 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.*

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

4.17.1.3 DVRPC and NJTPA Transportation Improvement Programs (2006-2008)

Under federal legislation, MPOs are required to prepare a Transportation Improvement Program (TIP) every two years. The purpose of the TIP is to list transportation projects (i.e., road improvements, bridge replacements, transit improvements, etc.) for which federal funding will be sought over a three-year period. Generally, the TIP reflects the transportation priorities for a region and is related to the

needs outlined in the MPO's Long Range Transportation Plan. Transportation projects up for federal funding must be financially constrained, and conform with federal air quality regulations as they relate to transportation.

The most current TIP released by the DVRPC, the MPO that has jurisdiction over Burlington and Mercer Counties, and NJTPA, the MPO that has jurisdiction over Middlesex County, cover fiscal years 2006-2008. The following federally-funded transportation projects in each of the Project Corridor counties may impact the Turnpike:

Burlington County

- U.S. Route 206 (Old York Road) / Rising Sun Road, Bordentown Township

  A new connector road between Rising Sun Road and U.S. Route 206 (Old York Road) will be built and the pavement on U.S. Route 206 and Rising Sun Road will also be rehabilitated. These two routes are heavily used because they provide a direct connection between Route I-295 and the Turnpike (Interchange 7). Total construction funding is anticipated to be approximately $25,300,000 and the project is scheduled to be completed in 2006.

Mercer County

- Route I-295 Rehabilitation, Route I-195 to U.S. Route 1

  Route I-295, a six-lane divided highway, will be rehabilitated from just north of Route I-195 to U.S. Route 1 (MP 60.40 - 67.80). This section of Route I-295 provides a direct connection between Route I-95 (at U.S. Route 1) and Route I-195. Vehicles can travel east on Route I-195, providing a link to the Turnpike at Interchange 7A. Total construction funding is anticipated to be approximately $14,000,000 and the project is scheduled to be completed in 2006.

- N.J. Route 33, Washington Township Bypass

  In conjunction with the Washington Township Proposed Town Center project, N.J. Route 33 will be realigned from Washington Boulevard to U.S. Route 130 in the vicinity of South Gold Drive. The original roadway will revert to a "main street" upon completion of this new N.J. Route 33 Bypass. N.J. Route 33 is a state highway that connects Trenton (at an intersection with U.S. Route 1 and N.J. Route 129) to Neptune Township (at an intersection with N.J. Route 71). Total construction funding is anticipated to be approximately $1,000,000 and the project is scheduled to be completed in 2006.

Middlesex

None of the projects listed in the TIP for Middlesex County in fiscal years 2006-2008 are either located in the Project Corridor or will have an impact on the Proposed Project.

4.17.1.4 Other Major Infrastructure Projects

Route I-95/Pennsylvania Turnpike (Route I-276) Interchange

The Pennsylvania Turnpike (Route I-276) currently terminates at the Delaware River Bridge. The highway continues east of the bridge as the Pearl Harbor Memorial Turnpike Extension of the New Jersey Turnpike (PHMTE) and connects with the Turnpike mainline at M.P. 51.0 via Interchange 6.

However, in 1969, when Route I-95 was extended north through eastern Pennsylvania, no provisions were made for a direct connection to the Pennsylvania Turnpike. Over the years, the absence of a direct link between Route I-95 and Route I-276 has created confusion for motorists, and has increased congestion on local roads in eastern Pennsylvania. The Pennsylvania Turnpike Interchange Project seeks to provide a direct connection to the Pennsylvania Turnpike (between Interchanges 28 and 29) with Route I-95, thus making Route I-95 continuous throughout the Mid-Atlantic region.

The Pennsylvania Turnpike is proposed to terminate just west of the new interchange at a new toll plaza. The section of the Pennsylvania Turnpike between east of the new interchange and the Delaware River will be re-designated from Route I-276 to Route I-95. Additionally, a second bridge will be built over the Delaware River to connect with the PHMTE (which will continue as Route I-95 to the N.J. Turnpike mainline).

The objectives for the Route I-95/Pennsylvania Turnpike (Route I-276) Interchange Project include:

- Improving the linkages between the Pennsylvania Turnpike and Route I-95 for easier interstate travel between Pennsylvania and New Jersey, thereby reducing traffic delays and improving travel time through the region.
- Completing the "missing link" of Route I-95 through the Mid-Atlantic region by constructing an interchange and re-designating sections of the Pennsylvania and New Jersey Turnpikes.
- Reducing the amount of traffic that currently uses local roads to make the connection between Route I-95 and the Pennsylvania Turnpike.
- Increasing the capacity on the Pennsylvania Turnpike and Route I-95 to accommodate the expected transfer of traffic from the local roads back to the interstate highways.

The full Pennsylvania Turnpike-Route I-95 Interchange Project consists of various essential elements including a high speed interchange between the two highways. Also, a new toll plaza will be built west of the interchange to collect tolls from motorists using the Pennsylvania Turnpike. East of the new interchange, an additional bridge will be built over the Delaware River and this section of the Pennsylvania Turnpike will be redesignated as Route I-95 up to its connection with the New Jersey Turnpike, thus completing the missing link of Route I-95. Design and construction of this new interchange began in September 2004 and will be completed in 2009.

As part of the EIS process for this project, a study of traffic impacts for the new interchange was prepared and recently updated by the DVRPC. The study includes traffic forecasts (given in terms of annual average daily traffic – AADT) for no-build and build scenarios for the years 2005 and 2025. Intermediate and peak hour forecasts were not included. Additional daily traffic forecasts on the New Jersey Turnpike due to the new Route I-95/Pennsylvania Turnpike interchange are shown in Table 4.34.

The results of the DVRPC's traffic study indicate that the new Route I-95/Pennsylvania Turnpike high capacity interchange is projected to cause a significant redistribution of traffic patterns in the region, resulting in more vehicles connecting to the New Jersey Turnpike at Interchange 6.

N.J Route 92 Connection

For more than 60 years, proposed N.J. Route 92 has been under various stages of planning by NJDOT. Since the 1970s, NJDOT had planned to construct a new N.J. Route 92 Freeway connecting the Turnpike with U.S. Route 1 to the west through the Princeton-Hightstown area.

Table 4.34
Annual Average Daily Traffic (AADT) Forecast on the New Jersey Turnpike
Due to the New Interstate 95-PA Turnpike Interchange

Location	Additional Daily Vehicles	
	2005	2025
New Jersey-Pennsylvania State Line	12,600	18,900
Pennsylvania Turnpike Extension East of U.S. Route 130	7,600	11,400
Turnpike North of Interchange 6 / PHMTE Connection	4,000	6,300
Turnpike South of Interchange 6 / PHMTE Connection	3,600	5,100

Source: Wilbur Smith Associates (2004).

In 1988, a new northerly alignment for N.J. Route 92 was proposed by NJDOT, extending it 13 miles west from Interchange 8A to U.S. Route 206 near Princeton. In 1992, the New Jersey State Legislature formally transferred the proposed N.J. Route 92 Freeway from the NJDOT to the Authority. Within two years, the Authority completed a Draft EIS for the new N.J. Route 92 Turnpike Extension. The length of proposed N.J. Route 92 was shortened from 13 miles to 6.7 miles west from the Turnpike mainline (at Interchange 8A) to U.S. Route 1 near Monmouth Junction. A full interchange is proposed at U.S. Route 130 in South Brunswick and a half interchange is proposed at Perrine Road. A mainline toll plaza is also proposed between these two interchanges.

A detailed analysis of N.J. Route 92 entitled *Traffic and Revenue Studies for Proposed Route 92* was completed by URS Consultants, Inc. (URS) in 1997. Local opposition to the N.J. Route 92 connection has delayed its construction, and the project is still in the environmental and regulatory review process.

4.17.2 Year 2012 and 2032 Traffic Projections

4.17.2.1 Turnpike Improvement Assumptions

Traffic volumes for the future study conditions were derived from the travel demand forecasting model (see Section 3.18 and Appendix D). The specific improvement assumptions for each mainline segment that were used in the model of the Build Condition are as follows:

- Interchange 6 to Interchange 7

  This segment would be widened from a 6-lane single roadway (with 3 car/truck lanes in each direction) to a 12-lane dual roadway (with 3 car-only lanes and 3 car/truck lanes in each direction).

- Interchange 7 to Interchange 7A

  This segment would be widened from a 6-lane single roadway (with 3 car/truck lanes in each direction) to a 12-lane dual roadway (with 3 car-only lanes and 3 car/truck lanes in each direction).

- Interchange 7A to Interchange 8

  This segment would be widened from a 6-lane single roadway (with 3 car/truck lanes in each direction) to a 12-lane dual roadway (with 3 car-only lanes and 3 car/truck lanes in each direction).

- Interchange 8 to Interchange 8A

  This segment would be widened from a 6-lane single roadway (with 3 car/truck lanes in each direction) to a 12-lane dual roadway (with 3 car-only lanes and 3 car/truck lanes in each direction). The southbound merge (from the dual to single roadway) and northbound diverge (from the single to dual roadway) between these interchanges would also be eliminated.

- Interchange 8A to Interchange 9

  This segment would be widened from a 10-lane dual roadway (with 3 car-only lanes and 2 car/truck lanes in each direction) to a 12-lane dual roadway (with 3 car-only lanes and 3 car/truck lanes in each direction) by adding one additional car/truck lane in the northbound and southbound outer roadways.

For the purposes of establishing traffic demand, Turnpike interchanges were assumed to have no capacity constraints. In addition to the above, traffic forecasts were prepared for conditions with and without proposed N.J. Route 92. For this analysis, a single N.J. Route 92 alternative consisting of a new express alignment from Turnpike Interchange 8A west to U.S. Route 1 (in the vicinity of Ridge Road, South Brunswick) was assumed. While the effect of N.J. Route 92 was generally negligible, a separate "with N.J. Route 92" scenario was developed and analyzed.

A total of 32 scenarios were developed based on a combination of the following conditions, years and time periods:

- No-Build and Build/ Conditions
- With and Without proposed N.J. Route 92
- Years: 2012 (ETC) and 2032 (ETC + 20)
- Time Periods: Weekday AM, Weekday PM, Friday PM, and Sunday PM peak hours

4.17.2.2 Projected No-Build and Build Condition Traffic Volumes

The travel demand forecasting model, as calibrated for the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours, was used to develop changes in peak hour volumes from 2005 to future years 2012 and 2032. Projected AM peak hour volumes were calculated as 43 percent of the AM 2-1/2-hour peak period volumes, while PM peak hour volumes were calculated as 35 percent of the PM 3-hour peak period volumes. These percentages were derived from 15-minute-interval volumes during peak periods extracted from the Authority's toll transaction data using NJT4 (New Jersey Turnpike Toll Transaction Tabulator). These changes were applied to the 2005 Turnpike mainline and ramp junction (entering/exiting) volumes, the ramps between the Turnpike toll plazas and the intersecting highways, and the adjacent sections of the intersecting highways.

Projected Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour volumes on the Turnpike mainline segments and entering/exiting ramps, the ramps between the Turnpike toll plazas and the intersecting highways, and the adjacent sections of intersecting highways for future years 2012 and 2032, for the No-Build and Build Conditions are discussed below.

Without N.J. Route 92

Tables 4.35 through 4.38 show a comparison of the 2005 Existing Condition mainline volumes with the projected 2012 and 2032 No-Build Condition and Build Condition mainline volumes without N.J. Route 92 for the Weekday AM peak hour, Weekday PM peak hour, Friday PM peak hour and Sunday PM peak hour, respectively.

Table 4.35
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (without N.J. Route 92)
Weekday AM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	2,560	No-Build	3,820	1,260	49.2%	5,280	2,720	106.3%
		Build	4,080	1,520	59.4%	5,710	3,150	123.0%
Int. 6 to 7	3,430	No-Build	4,320	890	25.9%	6,050	2,620	76.4%
		Build	4,620	1,190	34.7%	7,080	3,650	106.4%
Int. 7 to 7A	3,950	No-Build	4,830	880	22.3%	6,910	2,960	74.9%
		Build	5,100	1,150	29.1%	8,260	4,310	109.1%
Int. 7A to 8	4,870	No-Build	5,850	980	20.1%	7,960	3,090	63.4%
		Build	7,000	2,130	43.7%	10,330	5,460	112.1%
Int. 8 to 8A	5,730	No-Build	6,670	940	16.4%	8,720	2,990	52.2%
		Build	8,080	2,350	41.0%	12,030	6,300	109.9%
Int. 8A to 9	7,190	No-Build	8,120	930	12.9%	10,880	3,690	51.3%
		Build	9,000	1,810	25.2%	12,600	5,410	75.2%
Southbound Turnpike								
Int. 5 to 6	2,080	No-Build	2,580	500	24.0%	4,240	2,160	103.8%
		Build	2,660	580	27.9%	4,520	2,440	117.3%
Int. 6 to 7	2,970	No-Build	3,930	960	32.3%	6,360	3,390	114.1%
		Build	4,210	1,240	41.8%	7,120	4,150	139.7%
Int. 7 to 7A	3,200	No-Build	3,800	600	18.8%	5,920	2,720	85.0%
		Build	4,050	850	26.6%	6,600	3,400	106.3%
Int. 7A to 8	3,590	No-Build	4,220	630	17.5%	6,730	3,140	87.5%
		Build	4,530	940	26.2%	7,740	4,150	115.6%
Int. 8 to 8A	3,680	No-Build	4,230	550	14.9%	6,690	3,010	81.8%
		Build	4,930	1,250	34.0%	8,750	5,070	137.8%
Int. 8A to 9	5,040	No-Build	5,880	840	16.7%	7,820	2,780	55.2%
		Build	5,980	940	18.7%	8,680	3,640	72.2%

Source: The Louis Berger Group, Inc. 2006.

Table 4.36
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (without N.J. Route 92)
Weekday PM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	2,170	No-Build	2,840	670	30.9%	4,450	2,280	105.1%
		Build	3,030	860	39.6%	4,920	2,750	126.7%
Int. 6 to 7	2,910	No-Build	3,530	620	21.3%	5,510	2,600	89.3%
		Build	3,770	860	29.6%	6,340	3,430	117.9%
Int. 7 to 7A	3,170	No-Build	3,780	610	19.2%	5,670	2,500	78.9%
		Build	3,960	790	24.9%	6,570	3,400	107.3%
Int. 7A to 8	3,680	No-Build	4,440	760	20.7%	6,260	2,580	70.1%
		Build	4,810	1,130	30.7%	7,790	4,110	111.7%
Int. 8 to 8A	3,780	No-Build	4,560	780	20.6%	6,580	2,800	74.1%
		Build	5,090	1,310	34.7%	8,230	4,450	117.7%
Int. 8A to 9	5,000	No-Build	5,880	880	17.6%	8,690	3,690	73.8%
		Build	6,410	1,410	28.2%	9,670	4,670	93.4%
Southbound Turnpike								
Int. 5 to 6	2,630	No-Build	2,950	320	12.2%	4,180	1,550	58.9%
		Build	3,160	530	20.2%	4,460	1,830	69.6%
Int. 6 to 7	3,650	No-Build	4,030	380	10.4%	5,260	1,610	44.1%
		Build	4,250	600	16.4%	5,790	2,140	58.6%
Int. 7 to 7A	4,140	No-Build	4,420	280	6.8%	5,650	1,510	36.5%
		Build	4,550	410	9.9%	6,420	2,280	55.1%
Int. 7A to 8	4,810	No-Build	5,240	430	8.9%	6,430	1,620	33.7%
		Build	5,950	1,140	23.7%	8,410	3,600	74.8%
Int. 8 to 8A	5,160	No-Build	5,700	540	10.5%	7,580	2,420	46.9%
		Build	6,910	1,750	33.9%	10,040	4,880	94.6%
Int. 8A to 9	6,360	No-Build	7,170	810	12.7%	9,180	2,820	44.3%
		Build	7,620	1,260	19.8%	10,260	3,900	61.3%

Source: The Louis Berger Group, Inc. 2006.

Table 4.37
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (without N.J. Route 92)
Friday PM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	3,090	No-Build	3,890	800	25.9%	5,010	1,920	62.1%
		Build	4,260	1,170	37.9%	5,780	2,690	87.1%
Int. 6 to 7	4,140	No-Build	4,910	770	18.6%	6,290	2,150	51.9%
		Build	5,380	1,240	30.0%	7,630	3,490	84.3%
Int. 7 to 7A	4,270	No-Build	5,100	830	19.4%	6,670	2,400	56.2%
		Build	5,630	1,360	31.9%	8,210	3,940	92.3%
Int. 7A to 8	4,640	No-Build	5,480	840	18.1%	6,960	2,320	50.0%
		Build	6,280	1,640	35.3%	9,000	4,360	94.0%
Int. 8 to 8A	4,790	No-Build	5,630	840	17.5%	7,600	2,810	58.7%
		Build	6,630	1,840	38.4%	9,610	4,820	100.6%
Int. 8A to 9	6,020	No-Build	7,030	1,010	16.8%	9,660	3,640	60.5%
		Build	7,760	1,740	28.9%	10,960	4,940	82.1%
Southbound Turnpike								
Int. 5 to 6	4,170	No-Build	4,520	350	8.4%	5,510	1,340	32.1%
		Build	4,900	730	17.5%	6,010	1,840	44.1%
Int. 6 to 7	5,670	No-Build	6,010	340	6.0%	6,840	1,170	20.6%
		Build	6,560	890	15.7%	7,910	2,240	39.5%
Int. 7 to 7A	6,150	No-Build	6,460	310	5.0%	7,370	1,220	19.8%
		Build	6,960	810	13.2%	9,200	3,050	49.6%
Int. 7A to 8	6,610	No-Build	6,900	290	4.4%	7,550	940	14.2%
		Build	7,590	980	14.8%	9,980	3,370	51.0%
Int. 8 to 8A	6,530	No-Build	7,190	660	10.1%	8,470	1,940	29.7%
		Build	8,190	1,660	25.4%	11,210	4,680	71.7%
Int. 8A to 9	7,890	No-Build	8,830	940	11.9%	10,300	2,410	30.5%
		Build	8,960	1,070	13.6%	11,650	3,760	47.7%

Source: The Louis Berger Group, Inc. 2006.

Table 4.38
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (without N.J. Route 92)
Sunday PM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	3,430	No-Build	4,530	1,100	32.1%	6,680	3,250	94.8%
		Build	4,530	1,100	32.1%	6,690	3,260	95.0%
Int. 6 to 7	4,500	No-Build	5,390	890	19.8%	7,930	3,430	76.2%
		Build	5,390	890	19.8%	7,920	3,420	76.0%
Int. 7 to 7A	4,760	No-Build	5,720	960	20.2%	8,230	3,470	72.9%
		Build	5,720	960	20.2%	8,230	3,470	72.9%
Int. 7A to 8	5,150	No-Build	6,270	1,120	21.7%	8,630	3,480	67.6%
		Build	6,270	1,120	21.7%	8,630	3,480	67.6%
Int. 8 to 8A	5,320	No-Build	6,440	1,120	21.1%	8,560	3,240	60.9%
		Build	6,440	1,120	21.1%	8,560	3,240	60.9%
Int. 8A to 9	5,890	No-Build	7,080	1,190	20.2%	9,490	3,600	61.1%
		Build	7,090	1,200	20.4%	9,490	3,600	61.1%
Southbound Turnpike								
Int. 5 to 6	3,360	No-Build	4,710	1,350	40.2%	6,470	3,110	92.6%
		Build	4,710	1,350	40.2%	6,530	3,170	94.3%
Int. 6 to 7	4,690	No-Build	6,270	1,580	33.7%	8,940	4,250	90.6%
		Build	6,270	1,580	33.7%	8,950	4,260	90.8%
Int. 7 to 7A	4,950	No-Build	6,430	1,480	29.9%	9,090	4,140	83.6%
		Build	6,430	1,480	29.9%	9,090	4,140	83.6%
Int. 7A to 8	5,040	No-Build	6,240	1,200	23.8%	8,570	3,530	70.0%
		Build	6,240	1,200	23.8%	8,570	3,530	70.0%
Int. 8 to 8A	5,090	No-Build	6,250	1,160	22.8%	8,550	3,460	68.0%
		Build	6,250	1,160	22.8%	8,550	3,460	68.0%
Int. 8A to 9	5,630	No-Build	6,940	1,310	23.3%	9,130	3,500	62.2%
		Build	6,940	1,310	23.3%	9,130	3,500	62.2%

Source: The Louis Berger Group, Inc. 2006.

Weekday AM Peak Hour

The Weekday AM peak hour is projected to be the most heavily traveled time period for northbound Turnpike traffic. As shown in Table 4.35, from 2005 to 2012, the No-Build Condition traffic volumes without construction of N.J. Route 92 are projected to increase between 12.9 and 49.2 percent (northbound direction) and between 14.9 and 32.3 percent (southbound direction). The 2012 Build Condition traffic volumes are projected to increase between 25.2 and 59.4 percent (northbound direction) and between 18.7 and 41.8 percent (southbound direction). Overall, projected traffic growth in the No-Build Condition is less than the Build Condition, which is reflected by the limited capacity of the Turnpike mainline in the No-Build Condition compared with the Build Condition.

From 2005 to 2032, the No-Build traffic volumes are projected to increase between 51.3 and 106.3 percent (northbound direction) and between 55.2 and 114.1 percent (southbound direction). With the Proposed Project, the Build traffic volumes are projected to increase between 75.2 and 112.1 percent (northbound direction) and between 72.2 and 139.7 percent (southbound direction). The mainline segment with the highest growth is projected to be between Interchange 6 and Interchange 7 in the southbound direction, where traffic volumes are estimated to increase from 2,971 in 2005 to 7,117 in 2032, an overall growth of 139.7 percent.

Weekday PM Peak Hour

In the southbound direction, the Weekday (Monday-Thursday) PM peak hour will typically be less heavily traveled than the Friday PM peak hour. However, the travel model has been configured to estimate that growth on interchange ramps will be higher on weekdays than Fridays. As shown in Table 4.36, from 2005 to 2012, the No-Build Condition traffic volumes without construction of N.J. Route 92 are projected to increase between 17.6 and 30.9 percent (northbound direction) and 6.8 and 12.7 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 24.9 and 39.6 percent (northbound direction) and between 9.9 and 33.9 percent (southbound direction). By 2032, the No-Build Condition traffic volumes are projected to increase between 70.1 and 105.1 percent (northbound direction) and between 33.7 and 58.9 percent (southbound direction). By the same year, the Build Condition traffic volume is projected to increase between 93.4 and 126.7 percent (northbound direction) and between 55.1 and 94.6 percent (southbound direction).

Friday PM Peak Hour

The Friday PM peak hour will typically be the most heavily traveled day and hour in the southbound direction. As shown in Table 4.37, from 2005 to 2012, the No-Build Condition traffic volumes without construction of N.J. Route 92 are projected to increase between 16.8 and 25.9 percent (northbound direction) and 4.4 and 11.9 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 28.9 and 38.4 percent (northbound direction) and between 13.2 and 25.4 percent (southbound direction). From 2005 to 2032, the No-Build Condition traffic volumes are projected to increase between 50.0 and 62.1 percent (northbound direction) and between 14.2 and 32.1 percent (southbound direction). During the same time period, the Build Condition traffic volume is projected to increase between 82.1 and 100.6 percent (northbound direction) and between 39.5 and 71.7 percent (southbound direction).

The mainline segment, between Interchanges 8A and 9 (inner and outer roadway), is projected to have the highest Build Condition volumes in the southbound direction (11,650 vehicles per hour). This is closely followed by the southbound segment between Interchanges 8 and 8A, which is projected to have 11,210 vehicles per hour.

Sunday PM Peak Hour

Traffic volumes in the Sunday PM peak hour are generally higher in the northbound direction north of Interchange 7A and higher in the southbound direction south of Interchange 7A.

As shown in Table 4.38, from 2005 to 2012, the No-Build Condition traffic volumes without construction of N.J. Route 92 are projected to increase between 19.8 and 32.1 percent (northbound direction) and 22.8 and 40.2 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 20.4 and 32.1 percent (northbound direction) and between 22.8 and 40.2 percent (southbound direction). From 2005 to 2032, the No-Build Condition traffic volumes are projected to increase between 60.9 and 94.8 percent (northbound direction) and between 62.2 and 92.6 percent (southbound direction). During the same time period, the Build Condition traffic volume is projected to increase between 60.9 and 95.0 percent (northbound direction) and between 62.2 and 94.3 percent (southbound direction).

With N.J. Route 92

Tables 4.39 through 4.42 show a comparison of the 2005 Existing Condition mainline volumes with the projected 2012 and 2032 No-Build Condition and Build Condition mainline volumes with N.J. Route 92 for the Weekday AM peak hour, Weekday PM peak hour, Friday PM peak hour and Sunday PM peak hour, respectively.

There are principal differences between the estimated Build Condition volumes both with and without the construction of N.J. Route 92. The southbound mainline volumes between Interchanges 8A and 9 are higher by about 456 vehicles per hour in year 2032 with N.J. Route 92, while the southbound mainline volumes between Interchanges 8 and 8A are substantially lower by about 1,432 vehicles per hour with N.J. Route 92.

Weekday AM Peak Hour

With the construction of N.J. Route 92, the Weekday AM peak hour is also projected to be the most heavily traveled time period for northbound Turnpike traffic. As shown in Table 4.39, from 2005 to 2012, the No-Build Condition traffic volumes with construction of N.J. Route 92 are projected to increase between 13.2 and 49.2 percent (northbound direction) and between 15.2 and 32.7 percent (southbound direction). The 2012 Build Condition traffic volumes are projected to increase between 23.9 and 57.4 percent (northbound direction) and between 10.3 and 35.7 percent (southbound direction). Generally, projected traffic growth for the No-Build and Build Conditions with N.J. Route 92 is close to the projected traffic growth for the No-Build and Build Conditions without N.J. Route 92, with differences of less than 100 vehicles along all segments.

From 2005 to 2032, the No-Build traffic volumes are projected to increase between 52.9 and 105.1 percent (northbound direction) and between 63.9 and 113.8 percent (southbound direction). With the proposed widening, the Build traffic volumes are projected to increase between 77.2 and 125.0 percent (northbound direction) and between 81.3 and 139.1 percent (southbound direction). The mainline segment with the highest growth is projected to be between Interchange 6 and Interchange 7 in the southbound direction where traffic volumes are projected to increase from 2,970 in 2005 to 7,100 in 2032 (an overall growth of 139.1 percent).

Table 4.39
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (With N.J. Route 92)
Weekday AM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	2,560	No-Build	3,820	1,260	49.2%	5,250	2,690	105.1%
		Build	4,030	1,470	57.4%	5,760	3,200	125.0%
Int. 6 to 7	3,430	No-Build	4,320	890	25.9%	6,020	2,590	75.5%
		Build	4,580	1,150	33.5%	7,160	3,730	108.7%
Int. 7 to 7A	3,950	No-Build	4,830	880	22.3%	6,840	2,890	73.2%
		Build	5,120	1,170	29.6%	8,330	4,380	110.9%
Int. 7A to 8	4,870	No-Build	5,820	950	19.5%	7,770	2,900	59.5%
		Build	6,770	1,900	39.0%	10,380	5,510	113.1%
Int. 8 to 8A	5,730	No-Build	6,610	880	15.4%	8,760	3,030	52.9%
		Build	7,910	2,180	38.0%	12,050	6,320	110.3%
Int. 8A to 9	7,190	No-Build	8,140	950	13.2%	11,070	3,880	54.0%
		Build	8,910	1,720	23.9%	12,740	5,550	77.2%
Southbound Turnpike								
Int. 5 to 6	2,080	No-Build	2,580	500	24.0%	4,240	2,160	103.8%
		Build	2,510	430	20.7%	4,510	2,430	116.8%
Int. 6 to 7	2,970	No-Build	3,940	970	32.7%	6,350	3,380	113.8%
		Build	4,030	1,060	35.7%	7,100	4,130	139.1%
Int. 7 to 7A	3,200	No-Build	3,800	600	18.8%	5,910	2,710	84.7%
		Build	3,830	630	19.7%	6,600	3,400	106.3%
Int. 7A to 8	3,590	No-Build	4,220	630	17.5%	6,620	3,030	84.4%
		Build	4,370	780	21.7%	7,610	4,020	112.0%
Int. 8 to 8A	3,680	No-Build	4,240	560	15.2%	6,030	2,350	63.9%
		Build	4,060	380	10.3%	7,310	3,630	98.6%
Int. 8A to 9	5,040	No-Build	6,230	1,190	23.6%	9,080	4,040	80.2%
		Build	6,030	990	19.6%	9,140	4,100	81.3%

Source: The Louis Berger Group, Inc. 2006.

Table 4.40
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (With N.J. Route 92)
Weekday PM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	2,170	No-Build	2,820	650	30.0%	4,320	2,150	99.1%
		Build	3,030	860	39.6%	4,880	2,710	124.9%
Int. 6 to 7	2,910	No-Build	3,520	610	21.0%	5,420	2,510	86.3%
		Build	3,780	870	29.9%	6,310	3,400	116.8%
Int. 7 to 7A	3,170	No-Build	3,760	590	18.6%	5,590	2,420	76.3%
		Build	3,950	780	24.6%	6,570	3,400	107.3%
Int. 7A to 8	3,680	No-Build	4,330	650	17.7%	6,250	2,570	69.8%
		Build	4,770	1,090	29.6%	7,740	4,060	110.3%
Int. 8 to 8A	3,780	No-Build	4,390	610	16.1%	6,400	2,620	69.3%
		Build	4,930	1,150	30.4%	7,920	4,140	109.5%
Int. 8A to 9	5,000	No-Build	6,280	1,280	25.6%	9,230	4,230	84.6%
		Build	6,850	1,850	37.0%	10,160	5,160	103.2%
Southbound Turnpike								
Int. 5 to 6	2,630	No-Build	2,960	330	12.5%	4,170	1,540	58.6%
		Build	3,170	540	20.5%	4,490	1,860	70.7%
Int. 6 to 7	3,650	No-Build	4,040	390	10.7%	5,280	1,630	44.7%
		Build	4,240	590	16.2%	5,850	2,200	60.3%
Int. 7 to 7A	4,140	No-Build	4,430	290	7.0%	5,630	1,490	36.0%
		Build	4,540	400	9.7%	6,480	2,340	56.5%
Int. 7A to 8	4,810	No-Build	5,230	420	8.7%	6,540	1,730	36.0%
		Build	5,960	1,150	23.9%	8,540	3,730	77.5%
Int. 8 to 8A	5,160	No-Build	5,880	720	14.0%	7,490	2,330	45.2%
		Build	6,790	1,630	31.6%	10,010	4,850	94.0%
Int. 8A to 9	6,360	No-Build	7,160	800	12.6%	9,500	3,140	49.4%
		Build	7,590	1,230	19.3%	10,370	4,010	63.1%

Source: The Louis Berger Group, Inc. 2006.

Table 4.41
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (With N.J. Route 92)
Friday PM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	4,140	No-Build	3,890	800	25.9%	5,110	2,020	65.4%
		Build	4,260	1,170	37.9%	5,490	2,400	77.7%
Int. 6 to 7	4,270	No-Build	4,910	770	18.6%	6,430	2,290	55.3%
		Build	5,400	1,260	30.4%	7,270	3,130	75.6%
Int. 7 to 7A	4,640	No-Build	5,080	810	19.0%	6,450	2,180	51.1%
		Build	5,640	1,370	32.1%	8,260	3,990	93.4%
Int. 7A to 8	4,790	No-Build	5,400	760	16.4%	6,780	2,140	46.1%
		Build	6,210	1,570	33.8%	8,980	4,340	93.5%
Int. 8 to 8A	6,020	No-Build	5,610	820	17.1%	7,430	2,640	55.1%
		Build	6,520	1,730	36.1%	9,330	4,540	94.8%
Int. 8A to 9	4,140	No-Build	7,560	1,540	25.6%	10,150	4,130	68.6%
		Build	8,170	2,150	35.7%	11,270	5,250	87.2%
Southbound Turnpike								
Int. 5 to 6	4,170	No-Build	4,520	350	8.4%	5,660	1,490	35.7%
		Build	4,930	760	18.2%	6,000	1,830	43.9%
Int. 6 to 7	5,670	No-Build	6,010	340	6.0%	7,020	1,350	23.8%
		Build	6,610	940	16.6%	7,910	2,240	39.5%
Int. 7 to 7A	6,150	No-Build	6,470	320	5.2%	7,200	1,050	17.1%
		Build	7,160	1,010	16.4%	9,220	3,070	49.9%
Int. 7A to 8	6,610	No-Build	6,910	300	4.5%	7,290	680	10.3%
		Build	7,610	1,000	15.1%	10,050	3,440	52.0%
Int. 8 to 8A	6,530	No-Build	7,070	540	8.3%	8,170	1,640	25.1%
		Build	8,150	1,620	24.8%	11,060	4,530	69.4%
Int. 8A to 9	7,890	No-Build	8,910	1,020	12.9%	10,570	2,680	34.0%
		Build	8,980	1,090	13.8%	11,740	3,850	48.8%

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

Table 4.42
Projected 2012 and 2032 Turnpike Mainline Traffic Volumes (With N.J. Route 92)
Sunday PM Peak Hour

Mainline Segment	2005 Existing Volumes	Future Condition	2012			2032		
			Volumes	Change From 2005		Volumes	Change From 2005	
				No.	%		No.	%
Northbound Turnpike								
Int. 5 to 6	3,430	No-Build	4,530	1,100	32.1%	6,680	3,250	94.8%
		Build	4,510	1,080	31.5%	6,130	2,700	78.7%
Int. 6 to 7	4,500	No-Build	5,390	890	19.8%	7,930	3,430	76.2%
		Build	5,340	840	18.7%	7,540	3,040	67.6%
Int. 7 to 7A	4,760	No-Build	5,720	960	20.2%	8,230	3,470	72.9%
		Build	5,650	890	18.7%	7,980	3,220	67.6%
Int. 7A to 8	5,150	No-Build	6,270	1,120	21.7%	8,630	3,480	67.6%
		Build	6,140	990	19.2%	8,240	3,090	60.0%
Int. 8 to 8A	5,320	No-Build	6,440	1,120	21.1%	8,560	3,240	60.9%
		Build	6,300	980	18.4%	8,510	3,190	60.0%
Int. 8A to 9	5,890	No-Build	7,080	1,190	20.2%	9,490	3,600	61.1%
		Build	7,010	1,120	19.0%	9,550	3,660	62.1%
Southbound Turnpike								
Int. 5 to 6	3,360	No-Build	4,710	1,350	40.2%	6,530	3,170	94.3%
		Build	4,600	1,240	36.9%	6,280	2,920	86.9%
Int. 6 to 7	4,690	No-Build	6,270	1,580	33.7%	8,940	4,250	90.6%
		Build	6,500	1,810	38.6%	8,860	4,170	88.9%
Int. 7 to 7A	4,950	No-Build	6,430	1,480	29.9%	9,090	4,140	83.6%
		Build	6,720	1,770	35.8%	9,000	4,050	81.8%
Int. 7A to 8	5,040	No-Build	6,240	1,200	23.8%	8,570	3,530	70.0%
		Build	6,560	1,520	30.2%	8,660	3,620	71.8%
Int. 8 to 8A	5,090	No-Build	6,250	1,160	22.8%	8,550	3,460	68.0%
		Build	6,550	1,460	28.7%	8,420	3,330	65.4%
Int. 8A to 9	5,630	No-Build	6,940	1,310	23.3%	9,130	3,500	62.2%
		Build	7,210	1,580	28.1%	9,290	3,660	65.0%

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

Weekday PM Peak Hour

A comparison of projected Turnpike mainline traffic volumes in the future conditions with N.J. Route 92 to those without N.J. Route 92 show higher volumes between Interchanges 8A and 9, and slightly lower volumes along all other segments. As shown in Table 4.40, from 2005 to 2012, the No-Build Condition traffic volumes with construction of N.J. Route 92 are projected to increase between 16.1 and 30.0 percent (northbound direction) and 7.0 and 14.0 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 24.6 and 39.6 percent (northbound direction) and between 9.7 and 31.6 percent (southbound direction). By 2032, the No-Build Condition traffic volumes are projected to increase between 69.3 and 99.1 percent (northbound direction) and between 36.0 and 58.6 percent (southbound direction). By the same year,

the Build Condition traffic volumes are projected to increase between 103.2 and 124.9 percent (northbound direction) and between 56.5 and 94.0 percent (southbound direction).

Friday PM Peak Hour

With N.J. Route 92, the Friday PM Peak Hour is projected to remain the most heavily traveled day and hour in the southbound direction. As shown in Table 4.41, from 2005 to 2012, the No-Build Condition traffic volumes with construction of N.J. Route 92 are projected to increase between 16.4 and 25.9 percent (northbound direction) and 4.5 and 12.9 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 30.4 and 37.9 percent (northbound direction) and between 13.8 and 24.8 percent (southbound direction). From 2005 to 2032, the No-Build Condition traffic volumes are projected to increase between 46.1 and 68.6 percent (northbound direction) and between 10.3 and 35.7 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 75.6 and 94.8 percent (northbound direction) and between 39.5 and 69.4 percent (southbound direction). The mainline segment, between Interchanges 8A and 9 (inner and outer roadway) in the southbound direction, is projected to have the highest Build Condition volumes (11,740 vehicles per hour).

Sunday PM Peak Hour

Sunday No-Build and Build Condition volumes, both without and with the construction of N.J. Route 92, are very similar. As shown in Table 4.42, from 2005 to 2012, the No-Build Condition traffic volumes with construction of N.J. Route 92 are projected to increase between 19.8 and 32.1 percent (northbound direction) and 22.8 and 40.2 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 18.4 and 31.5 percent (northbound direction) and between 28.1 and 36.9 percent (southbound direction). From 2005 to 2032, the No-Build Condition traffic volumes are projected to increase between 60.9 and 94.8 percent (northbound direction) and between 62.2 and 94.3 percent (southbound direction). During the same time period, the Build Condition traffic volumes are projected to increase between 60.0 and 78.7 percent (northbound direction) and between 65.0 and 88.9 percent (southbound direction).

4.17.3 Year 2012 and 2032 Level of Service Analyses

4.17.3.1 Methodologies and Assumptions

Year 2012 and 2032 No-Build and Build Conditions (with and without N.J. Route 92) level of service (LOS) analyses were completed for the Weekday AM, Weekday PM, Friday PM, and Sunday PM peak hours. The analyses included Turnpike mainline segments, exit ramps, and entrance ramps from south of Interchange 6 to north of Interchange 8A. Three types of analyses were performed, using methodologies and procedures from the *2000 Highway Capacity Manual (HCM)*:

- Mainline Sections (HCM section: Basic Freeway Segments)
- Exits (HCM section: Ramps and Ramp Junctions – Diverge Influence Areas)
- Entrances (HCM section: Ramps and Ramp Junctions – Merge Influence Areas)

These methodologies are discussed in detail in Section 3.18.

For the 2012 and 2032 Build Conditions, where a 12-lane roadway (3-lane inner and 3-lane outer roadways in each direction) replaces the existing 6-lane roadway (3-lanes northbound and 3-lanes southbound), traffic volumes were split between the inner and outer roadways according to the following assumptions:

- The inner roadway was restricted to only passenger cars and light trucks (Class 1), while all vehicles were permitted on the outer roadway;
- As an initial upstream condition, volumes were assigned to the roadways to achieve a balance in passenger-car-equivalents (PCEs) per lane;
- Exiting volumes were proportional to roadway volumes, with Class 1 and other vehicles considered separately; and
- Entering volumes were assigned to the roadways to achieve a balance in PCEs per lane downstream from the interchange.

In the absence of data regarding actual roadway volume splits, these assumptions provided reasonable estimates for the Build Condition.

4.17.3.2 Future Traffic Level of Service

Future traffic operating conditions were assessed in the Project Corridor using the HCM criteria described in the previous section. Detailed LOS analyses were conducted for No-Build and Build Condition Turnpike mainline sections (between Interchange 5 and Interchange 9) and ramp junctions.

Year 2012 No-Build (Without N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 18 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS analysis without construction of N.J. Route 92 is presented in Tables 4.43 through 4.46. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better except for the following:

- Between Interchange 6 and Interchange 7
  Mainline segment M04 (southbound) is projected to operate at LOS "E" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7 and Interchange 7A
  Mainline segment M06 (southbound) is projected to operate at LOS "E" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7A and Interchange 8
  Mainline segment M07 (northbound) is projected to operate at LOS "E" during both the Weekday AM and Sunday PM peak hours.

  Mainline segment M08 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour and at LOS "E" during the Sunday PM peak hour.

- Between Interchange 8 and Interchange 8A
  Mainline segment M09 (northbound) is projected to operate at LOS "F" during the Friday PM peak hour and at LOS "E" during the Sunday PM peak hour.

  Mainline segment M12 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour and at LOS "E" during the Sunday PM peak hour.

Table 4.43
2012 Level of Service Summary (Without N.J. Route 92) – Weekday AM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 Weekday AM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	3,820	0.60	20.5	C	M01	4,080	0.64	22.0	C	-	-	-	-	-	NO	-
NB	M01	3,820	0.60	20.5	C	M01A	2,180	0.32	10.9	A	M01B	1,90	0.32	10.9	A	NO	NO
SB	M02	2,580	0.41	14.2	B	M02	2,660	0.42	14.4	B	-	-	-	-	-	NO	-
SB	M02	2,580	0.41	14.2	B	M02A	1,360	0.20	6.8	A	M02B	1,30	0.22	7.6	A	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	4,320	0.68	23.6	C	M03A	2,450	0.36	12.3	B	M03B	2,17	0.37	12.6	B	NO	NO
SB	M04	3,930	0.63	21.6	C	M04A	2,150	0.31	10.8	A	M04B	2,06	0.31	12.1	A	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	4,830	0.76	27.1	D	M05A	2,700	0.39	13.5	B	M05B	2,40	0.41	14.0	B	NO	NO
SB	M06	3,800	0.61	20.9	C	M06A	2,030	0.30	10.2	A	M06B	2,02	0.35	11.9	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	5,850	0.92	37.2	E	M07A	3,690	0.54	18.5	C	M07B	3,31	0.56	19.1	C	NO	NO
SB	M08	4,220	0.68	23.4	C	M08A	2,310	0.34	11.6	B	M08B	2,22	0.39	13.2	B	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	6,670	1.04	*	F	M09A	4,230	0.62	21.3	C	M09B	3,85	0.64	22.1	C	NO	NO
NB Inner	M10A	4,290	0.63	21.6	C	M10A	4,230	0.62	21.3	C	-	-	-	-	-	NO	-
NB Outer	M10B	2,380	0.63	21.6	C	-	-	-	-	-	M10B	3,85	0.64	22.1	C	-	NO
SB	M11	4,230	0.68	23.7	C	M11A	2,500	0.37	12.5	B	M11B	2,43	0.43	14.7	B	NO	NO
SB Inner	M12A	2,380	0.35	11.9	B	M12A	2,500	0.37	12.5	B	-	-	-	-	-	NO	-
SB Outer	M12B	1,860	0.50	17.2	B	-	-	-	-	-	M12B	2,43	0.43	14.7	B	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	5,220	0.76	27.1	D	M13A	4,700	0.69	23.9	C	-	-	-	-	-	NO	-
NB Outer	M13B	2,900	0.75	26.7	D	-	-	-	-	-	M13B	4,30	0.71	24.8	C	-	NO
SB Inner	M14A	3,830	0.56	19.2	C	M14A	3,220	0.47	16.1	B	-	-	-	-	-	NO	-
SB Outer	M14B	2,050	0.56	19.2	C	-	-	-	-	-	M14B	2,76	0.47	16.1	B	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.44
2012 Level of Service Summary (Without N.J. Route 92) – Weekday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 Weekday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	2,840	0.44	15.1	B	M01	3,030	0.47	16.2	B	-	-	-	-	-	NO	-
NB	M01	2,840	0.44	15.1	B	M01A	1,610	0.24	8.1	A	M01B	1,420	0.24	8.1	A	NO	NO
SB	M02	2,950	0.46	15.9	B	M02	3,170	0.50	17.1	B	-	-	-	-	-	NO	-
SB	M02	2,950	0.46	15.9	B	M02A	1,560	0.23	7.8	A	M02B	1,600	0.27	9.2	A	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	3,530	0.55	18.9	C	M03A	2,000	0.29	10.0	A	M03B	1,770	0.29	10.1	A	NO	NO
SB	M04	4,030	0.64	21.9	C	M04A	2,110	0.31	10.6	A	M04B	2,140	0.31	12.4	A	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	3,780	0.59	20.3	C	M05A	2,110	0.31	10.6	A	M05B	1,850	0.31	10.6	A	NO	NO
SB	M06	4,420	0.70	24.4	C	M06A	2,250	0.33	11.3	B	M06B	2,300	0.39	13.3	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	4,440	0.70	24.2	C	M07A	2,530	0.37	12.7	B	M07B	2,280	0.38	13.1	B	NO	NO
SB	M08	5,240	0.82	30.3	D	M08A	3,030	0.44	15.2	B	M08B	2,920	0.48	16.5	B	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	4,560	0.72	25.1	C	M09A	2,660	0.39	13.3	B	M09B	2,430	0.41	14.0	B	NO	NO
NB Inner	M10A	2,940	0.43	14.8	B	M10A	2,660	0.39	13.3	B	-	-	-	-	-	NO	-
NB Outer	M10B	1,620	0.43	14.8	B	-	-	-	-	-	M10B	2,430	0.41	14.0	B	-	NO
SB	M11	5,700	0.89	34.8	D	M11A	3,570	0.52	17.9	B	M11B	3,340	0.55	18.8	C	NO	NO
SB Inner	M12A	3,320	0.49	16.7	B	M12A	3,570	0.52	17.9	B	-	-	-	-	-	NO	-
SB Outer	M12B	2,380	0.61	21.0	C	-	-	-	-	-	M12B	3,340	0.55	18.8	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	3,790	0.55	19.0	C	M13A	3,360	0.49	16.8	B	-	-	-	-	-	NO	-
NB Outer	M13B	2,090	0.55	18.7	C	-	-	-	-	-	M13B	3,050	0.51	17.4	B	-	NO
SB Inner	M14A	4,580	0.67	23.2	C	M14A	4,010	0.59	20.1	C	-	-	-	-	-	NO	-
SB Outer	M14B	2,590	0.67	23.2	C	-	-	-	-	-	M14B	3,610	0.59	20.1	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.45
2012 Level of Service Summary (Without N.J. Route 92) – Friday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 Friday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	3,890	0.59	20.2	C	M01	4,260	0.65	22.3	C	-	-	-	-	-	NO	-
NB	M01	3,890	0.59	20.2	C	M01A	2,220	0.32	11.1	B	M01B	2,040	0.32	11.1	B	NO	NO
SB	M02	4,520	0.69	24.1	C	M02	4,900	0.74	26.3	D	-	-	-	-	-	NO	-
SB	M02	4,520	0.69	24.1	C	M02A	2,590	0.38	13.0	B	M02B	2,310	0.37	12.5	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	4,910	0.74	26.3	D	M03A	2,800	0.41	14.0	B	M03B	2,580	0.41	14.0	B	NO	NO
SB	M04	6,010	0.93	37.4	E	M04A	3,440	0.50	17.2	B	M04B	3,120	0.50	17.1	B	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	5,100	0.78	27.7	D	M05A	2,940	0.43	14.7	B	M05B	2,690	0.43	14.7	B	NO	NO
SB	M06	6,460	1.00	44.8	E	M06A	3,620	0.53	18.2	C	M06B	3,340	0.54	18.4	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	5,480	0.84	31.4	D	M07A	3,260	0.48	16.4	B	M07B	3,020	0.49	16.6	B	NO	NO
SB	M08	6,900	1.07		F	M08A	3,940	0.58	19.7	C	M08B	3,650	0.59	20.2	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	5,630	0.87	32.9	D	M09A	3,440	0.50	17.3	B	M09B	3,190	0.51	17.7	B	NO	NO
NB Inner	M10A	3,560	0.52	17.8	B	M10A	3,440	0.50	17.3	B	-	-	-	-	-	NO	-
NB Outer	M10B	2,070	0.52	17.8	B	-	-	-	-	-	M10B	3,190	0.51	17.7	B	-	NO
SB	M11	7,190	1.23		F	M11A	4,260	0.62	21.4	C	M11B	3,930	0.63	21.8	C	NO	NO
SB Inner	M12A	4,250	0.62	21.4	C	M12A	4,260	0.62	21.4	C	-	-	-	-	-	NO	-
SB Outer	M12B	2,940	0.73	25.8	C	-	-	-	-	-	M12B	3,930	0.63	21.8	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	4,460	0.65	22.5	C	M13A	4,040	0.59	20.3	C	-	-	-	-	-	NO	-
NB Outer	M13B	2,570	0.65	22.2	C	-	-	-	-	-	M13B	3,720	0.60	20.6	C	-	NO
SB Inner	M14A	5,580	0.82	29.8	D	M14A	4,690	0.69	23.8	C	-	-	-	-	-	NO	-
SB Outer	M14B	3,250	0.82	29.8	D	-	-	-	-	-	M14B	4,270	0.69	23.8	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.46
2012 Level of Service Summary (Without N.J. Route 92) – Sunday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 Sunday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	4,530	0.68	23.5	C	M01	4,530	0.68	23.5	C	-	-	-	-	-	NO	-
NB	M01	4,530	0.68	23.5	C	M01A	2,320	0.34	11.6	B	M01B	2,210	0.34	11.6	B	NO	NO
SB	M02	4,710	0.73	25.4	C	M02	4,710	0.73	25.4	C	-	-	-	-	-	NO	-
SB	M02	4,710	0.73	25.4	C	M02A	2,390	0.35	12.0	B	M02B	2,320	0.35	12.1	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	5,390	0.80	29.1	D	M03A	2,750	0.40	13.8	B	M03B	2,640	0.40	13.8	B	NO	NO
SB	M04	6,270	0.93	37.8	E	M04A	3,180	0.46	15.9	B	M04B	3,090	0.46	16.0	B	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	5,720	0.85	32.0	D	M05A	2,920	0.43	14.6	B	M05B	2,800	0.43	14.6	B	NO	NO
SB	M06	6,430	0.95	40.0	E	M06A	3,250	0.48	16.3	B	M06B	3,180	0.48	16.4	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	6,270	0.94	38.3	E	M07A	3,190	0.47	16.0	B	M07B	3,080	0.47	16.1	B	NO	NO
SB	M08	6,240	0.93	37.4	E	M08A	3,160	0.46	15.8	B	M08B	3,080	0.47	15.9	B	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	6,440	0.96	40.6	E	M09A	3,280	0.48	16.4	B	M09B	3,160	0.48	16.5	B	NO	NO
NB Inner	M10A	3,940	0.58	19.8	C	M10A	3,280	0.48	16.4	B	-	-	-	-	-	NO	-
NB Outer	M10B	2,500	0.58	19.8	C	-	-	-	-	-	M10B	3,160	0.48	16.5	B	-	NO
SB	M11	6,250	0.93	37.6	E	M11A	3,160	0.46	15.8	B	M11B	3,090	0.47	16.0	B	NO	NO
SB Inner	M12A	3,670	0.54	18.4	C	M12A	3,160	0.46	15.8	B	-	-	-	-	-	NO	-
SB Outer	M12B	2,580	0.59	20.1	C	-	-	-	-	-	M12B	3,090	0.47	16.0	B	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	4,330	0.63	21.8	C	M13A	3,600	0.53	18.1	C	-	-	-	-	-	NO	-
NB Outer	M13B	2,750	0.64	21.9	C	-	-	-	-	-	M13B	3,490	0.53	18.2	C	-	NO
SB Inner	M14A	4,220	0.62	21.2	C	M14A	3,520	0.51	17.6	B	-	-	-	-	-	NO	-
SB Outer	M14B	2,720	0.62	21.2	C	-	-	-	-	-	M14B	3,420	0.51	17.6	B	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Ramp Junctions (Merge and Diverge) Analysis

A total of 23 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis without construction of N.J. Route 92 is presented in Tables 4.47 through 4.50. During the analyzed peak hours, all ramps are projected to operate at LOS D or better except for the following:

- Interchange 7A
  On-Ramp R10 (northbound) is projected to operate at LOS "E" during both the Weekday AM and Sunday PM peak hours.

  Off-ramp R11 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour.

  Off-ramp R12 (southbound) is projected to operate at LOS "E" during the Friday PM peak hour.

- Interchange 8
  On-ramp R14 (northbound) is projected to operate at LOS "E" during the Sunday PM peak hour and at LOS "F" during the Weekday AM peak hour.

  Off-ramp R15 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour.

  On-ramp R16 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour.

Year 2012 Build (Without N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 30 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS analysis without construction of N.J. Route 92 is presented in Tables 4.43 through 4.46. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better.

Ramp Junctions (Merge and Diverge) Analysis

A total of 40 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis without construction of N.J. Route 92 is presented in Tables 4.47 through 4.50. During the analyzed peak hours, all ramps are projected to operate at LOS D or better.

Year 2032 No-Build (Without N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 18 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS analysis without construction of N.J. Route 92 is presented in Tables 4.51 through 4.54. During the

Table 4.47
2012 Level of Service Summary (Without N.J. Route 92) – Weekday AM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2012 Weekday AM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	750	0.54	15.2	B	R01A	430	0.39	9.3	A	R01B	320	0.38	9.2	A	NO	NO
NB On	R02	1,250	0.73	19.3	B	R02A	690	0.38	(4.4)	A	R02B	590	0.39	(4.0)	A	NO	NO
SB Off	R03	1,580	0.69	18.0	B	R03A	880	0.35	(3.3)	A	R03B	850	0.39	(1.6)	A	NO	NO
SB On	R04	230	0.41	16.2	B	R04A	90	0.20	5.5	A	R04B	90	0.22	6.2	A	NO	NO
Interchange 7																	
NB Off	R05	340	0.72	20.2	C	R05A	200	0.42	8.6	A	R05B	150	0.43	8.9	A	NO	NO
NB On	R06	850	0.79	30.2	D	R06A	440	0.42	10.8	B	R06B	380	0.44	10.6	B	NO	NO
SB Off	R07	460	0.67	19.6	B	R07A	250	0.36	7.3	A	R07B	270	0.41	9.4	A	NO	NO
SB On	R08	600	0.65	24.2	C	R08A	360	0.34	7.8	A	R08B	310	0.38	9.2	A	NO	NO
Interchange 7A																	
NB Off	R09	490	0.80	23.8	C	R09A	340	0.46	11.1	B	R09B	280	0.47	11.6	B	NO	NO
NB On	R10	1,520	1.01	37.6	E	R10A	1,330	0.60	(4.6)	A	R10B	1,200	0.62	(5.3)	A	NO	NO
SB Off	R11	970	0.75	22.3	C	R11A	680	0.34	(5.5)	A	R11B	580	0.37	(4.2)	A	NO	NO
SB On	R12	550	0.63	21.8	C	R12A	400	0.32	8.6	A	R12B	370	0.37	10.4	B	NO	NO
Interchange 8																	
NB Off	R13	450	0.91	28.4	D	R13A	270	0.60	16.5	B	R13B	220	0.61	17.0	B	NO	NO
NB On	R14	1,270	1.09	40.8	F	R14A	820	0.67	19.6	B	R14B	760	0.70	19.7	B	NO	NO
SB Off	R15	430	0.73	21.4	C	R15A	450	0.44	10.4	B	R15B	440	0.50	12.9	B	NO	NO
SB On	R16	410	0.67	26.0	C	R16A	250	0.35	9.6	A	R16B	240	0.39	11.3	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	250	0.67	20.8	C	R17A	440	0.67	20.9	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	170	0.68	20.7	C	-	-	-	-	-	R17B	380	0.69	21.0	C	-	NO
NB On-In	R18A	1,180	0.82	30.9	D	R18A	910	0.75	22.2	C	-	-	-	-	-	NO	-
NB On-Out	R18B	690	0.79	30.7	D	-	-	-	-	-	R18B	830	0.77	22.4	C	-	NO
SB Off-In	R19A	1,460	0.68	21.6	C	R19A	990	0.57	17.3	B	-	-	-	-	-	NO	-
SB Off-Out	R19B	610	0.61	19.8	B	-	-	-	-	-	R19B	570	0.55	17.3	B	-	NO
SB On	R20	410	0.52	21.4	C	R20A	280	0.38	10.7	B	R20B	240	0.44	12.8	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.48
2012 Level of Service Summary (Without N.J. Route 92) – Weekday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2012 Weekday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	340	0.37	8.7	A	R01A	190	0.29	5.4	A	R01B	160	0.29	5.4	A	NO	NO
NB On	R02	1,030	0.59	14.4	B	R02A	580	0.31	(6.8)	A	R02B	510	0.31	(6.7)	A	NO	NO
SB Off	R03	1,290	0.65	16.6	B	R03A	630	0.31	(4.7)	A	R03B	620	0.36	(2.8)	A	NO	NO
SB On	R04	210	0.45	17.9	B	R04A	80	0.23	6.5	A	R04B	80	0.26	7.9	A	NO	NO
Interchange 7																	
NB Off	R05	140	0.60	15.6	B	R05A	100	0.34	5.8	A	R05B	90	0.35	5.9	A	NO	NO
NB On	R06	390	0.59	23.1	C	R06A	210	0.32	7.2	A	R06B	170	0.32	6.5	A	NO	NO
SB Off	R07	710	0.76	23.0	C	R07A	310	0.39	8.6	A	R07B	320	0.46	11.0	B	NO	NO
SB On	R08	320	0.63	23.6	C	R08A	180	0.32	7.1	A	R08B	150	0.37	9.0	A	NO	NO
Interchange 7A																	
NB Off	R09	500	0.65	18.4	B	R09A	330	0.37	7.7	A	R09B	240	0.37	7.6	A	NO	NO
NB On	R10	1,160	0.76	29.0	D	R10A	750	0.40	(11.7)	A	R10B	660	0.41	(12.6)	A	NO	NO
SB Off	R11	1,280	0.88	27.2	C	R11A	1,040	0.46	(0.7)	A	R11B	850	0.47	(0.3)	A	NO	NO
SB On	R12	470	0.71	24.7	C	R12A	260	0.34	9.3	A	R12B	240	0.40	11.4	B	NO	NO
Interchange 8																	
NB Off	R13	420	0.74	21.9	C	R13A	220	0.43	10.2	B	R13B	160	0.44	10.6	B	NO	NO
NB On	R14	540	0.72	27.9	C	R14A	350	0.41	10.3	B	R14B	310	0.43	10.4	B	NO	NO
SB Off	R15	800	0.90	28.0	D	R15A	800	0.61	16.8	B	R15B	660	0.63	17.6	B	NO	NO
SB On	R16	330	0.79	30.6	D	R16A	260	0.45	13.3	B	R16B	250	0.49	14.7	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	120	0.49	13.7	B	R17A	140	0.45	12.2	B	-	-	-	-	-	NO	-
NB Off-Out	R17B	90	0.47	12.6	B	-	-	-	-	-	R17B	140	0.47	12.4	B	-	NO
NB On-In	R18A	970	0.60	23.3	C	R18A	840	0.55	15.2	B	-	-	-	-	-	NO	-
NB On-Out	R18B	560	0.57	23.0	C	-	-	-	-	-	R18B	760	0.57	15.1	B	-	NO
SB Off-In	R19A	1,260	0.76	24.5	C	R19A	770	0.66	20.8	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	650	0.73	24.3	C	-	-	-	-	-	R19B	570	0.65	21.3	C	-	NO
SB On	R20	440	0.64	25.5	C	R20A	330	0.53	16.2	B	R20B	300	0.56	17.2	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.49
2012 Level of Service Summary (Without N.J. Route 92) – Friday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2012 Friday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	390	0.49	13.1	B	R01A	210	0.38	9.1	A	R01B	200	0.38	9.1	A	NO	NO
NB On	R02	1,410	0.80	21.6	C	R02A	800	0.44	(2.4)	A	R02B	740	0.44	(2.5)	A	NO	NO
SB Off	R03	1,800	0.93	27.2	C	R03A	900	0.49	2.0	A	R03B	870	0.50	2.3	A	NO	NO
SB On	R04	300	0.67	25.8	C	R04A	60	0.37	11.5	B	R04B	60	0.35	11.1	B	NO	NO
Interchange 7																	
NB Off	R05	330	0.78	22.1	C	R05A	180	0.47	10.5	B	R05B	170	0.47	10.5	B	NO	NO
NB On	R06	520	0.77	29.6	D	R06A	310	0.44	11.7	B	R06B	280	0.45	10.9	B	NO	NO
SB Off	R07	780	0.97	31.1	D	R07A	370	0.59	16.2	B	R07B	370	0.60	16.5	B	NO	NO
SB On	R08	330	0.90	33.3	D	R08A	180	0.50	13.8	B	R08B	160	0.50	13.8	B	NO	NO
Interchange 7A																	
NB Off	R09	800	0.82	24.6	C	R09A	480	0.50	12.6	B	R09B	390	0.50	12.5	B	NO	NO
NB On	R10	1,180	0.90	33.9	D	R10A	800	0.50	(8.2)	A	R10B	720	0.50	(9.2)	A	NO	NO
SB Off	R11	1,080	1.03	32.7	F	R11A	690	0.51	1.2	A	R11B	660	0.53	1.8	A	NO	NO
SB On	R12	640	1.00	35.2	E	R12A	380	0.54	16.6	B	R12B	350	0.55	16.8	B	NO	NO
Interchange 8																	
NB Off	R13	340	0.85	26.1	C	R13A	170	0.53	14.1	B	R13B	140	0.54	14.4	B	NO	NO
NB On	R14	490	0.85	32.7	D	R14A	350	0.52	14.4	B	R14B	320	0.53	14.1	B	NO	NO
SB Off	R15	830	1.04	33.2	F	R15A	650	0.69	19.8	B	R15B	590	0.70	20.2	C	NO	NO
SB On	R16	540	1.04	39.3	F	R16A	330	0.58	18.0	B	R16B	310	0.59	18.5	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	100	0.57	17.0	B	R17A	240	0.56	16.6	B	-	-	-	-	-	NO	-
NB Off-Out	R17B	80	0.57	16.3	B	-	-	-	-	-	R17B	220	0.57	16.5	B	-	NO
NB On-In	R18A	1,010	0.70	26.7	C	R18A	840	0.65	18.7	B	-	-	-	-	-	NO	-
NB On-Out	R18B	580	0.67	26.7	C	-	-	-	-	-	R18B	760	0.66	18.4	B	-	NO
SB Off-In	R19A	1,330	0.88	28.9	D	R19A	810	0.75	24.0	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	740	0.89	30.3	D	-	-	-	-	-	R19B	680	0.74	24.7	C	-	NO
SB On	R20	430	0.76	30.1	D	R20A	380	0.63	19.8	B	R20B	350	0.64	20.2	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.50
2012 Level of Service Summary (Without N.J. Route 92) – Sunday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2012 Sunday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	510	0.57	16.1	B	R01A	260	0.40	9.8	A	R01B	250	0.40	9.8	A	NO	NO
NB On	R02	1,370	0.84	23.2	C	R02A	690	0.42	(3.0)	A	R02B	680	0.42	(3.0)	A	NO	NO
SB Off	R03	1,710	0.91	26.5	C	R03A	870	0.46	0.9	A	R03B	840	0.46	0.8	A	NO	NO
SB On	R04	150	0.67	25.6	C	R04A	80	0.34	10.6	B	R04B	70	0.34	10.8	B	NO	NO
Interchange 7																	
NB Off	R05	350	0.82	23.9	C	R05A	180	0.46	10.2	B	R05B	170	0.46	10.2	B	NO	NO
NB On	R06	680	0.86	32.6	D	R06A	350	0.44	11.6	B	R06B	330	0.45	11.0	B	NO	NO
SB Off	R07	470	0.93	29.5	D	R07A	230	0.54	14.1	B	R07B	240	0.54	14.2	B	NO	NO
SB On	R08	310	0.90	33.4	D	R08A	160	0.47	12.5	B	R08B	150	0.47	12.5	B	NO	NO
Interchange 7A																	
NB Off	R09	770	0.87	26.7	C	R09A	400	0.50	12.4	B	R09B	370	0.49	12.3	B	NO	NO
NB On	R10	1,320	0.99	37.2	E	R10A	670	0.47	(9.0)	A	R10B	650	0.48	(10.1)	A	NO	NO
SB Off	R11	660	0.92	28.7	D	R11A	330	0.38	(3.7)	A	R11B	330	0.39	(3.6)	A	NO	NO
SB On	R12	850	0.98	34.3	D	R12A	430	0.50	14.9	B	R12B	420	0.50	15.0	B	NO	NO
Interchange 8																	
NB Off	R13	300	0.91	28.5	D	R13A	150	0.52	13.7	B	R13B	150	0.53	13.8	B	NO	NO
NB On	R14	460	0.93	35.6	E	R14A	230	0.49	13.2	B	R14B	230	0.49	12.6	B	NO	NO
SB Off	R15	360	0.91	28.3	D	R15A	180	0.52	13.5	B	R15B	180	0.52	13.6	B	NO	NO
SB On	R16	350	0.89	34.1	D	R16A	180	0.46	13.7	B	R16B	170	0.46	13.9	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	110	0.62	18.9	B	R17A	90	0.53	15.5	B	-	-	-	-	-	NO	-
NB Off-Out	R17B	70	0.63	18.6	B	-	-	-	-	-	R17B	80	0.53	15.0	B	-	NO
NB On-In	R18A	500	0.63	24.7	C	R18A	420	0.55	15.3	B	-	-	-	-	-	NO	-
NB On-Out	R18B	320	0.66	26.5	C	-	-	-	-	-	R18B	410	0.55	14.8	B	-	NO
SB Off-In	R19A	550	0.68	21.4	C	R19A	460	0.58	17.7	B	-	-	-	-	-	NO	-
SB Off-Out	R19B	330	0.67	22.1	C	-	-	-	-	-	R19B	430	0.58	18.6	B	-	NO
SB On	R20	190	0.61	24.7	C	R20A	100	0.45	13.5	B	R20B	100	0.46	13.7	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.* = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.51
2032 Level of Service Summary (Without N.J. Route 92) – Weekday AM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 Weekday AM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	5,280	0.82	29.8	D	M01	5,700	0.88	33.8	D	-	-	-	-	-	NO	-
NB	M01	5,280	0.82	29.8	D	M01A	3,010	0.44	15.1	B	M01B	2,700	0.44	15.1	B	NO	NO
SB	M02	4,240	0.66	23.0	C	M02	4,520	0.71	24.6	C	-	-	-	-	-	NO	-
SB	M02	4,240	0.66	23.0	C	M02A	2,300	0.34	11.5	B	M02B	2,220	0.37	12.7	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	6,050	0.94	38.4	E	M03A	3,730	0.55	18.7	C	M03B	3,350	0.55	18.9	C	NO	NO
SB	M04	6,360	1.00	44.6	E	M04A	3,680	0.54	18.4	C	M04B	3,440	0.54	19.6	C	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	6,910	1.08	*	F	M05A	4,390	0.64	22.1	C	M05B	3,870	0.65	22.3	C	NO	NO
SB	M06	5,920	0.93	37.7	E	M06A	3,390	0.50	17.0	B	M06B	3,210	0.54	18.4	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	7,960	1.25	*	F	M07A	5,460	0.80	28.9	D	M07B	4,870	0.81	29.3	D	NO	NO
SB	M08	6,730	1.06	*	F	M08A	4,010	0.59	20.1	C	M08B	3,730	0.63	21.5	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	8,720	1.37	*	F	M09A	6,310	0.92	37.0	E	M09B	5,720	0.94	38.4	E	NO	NO
NB Inner	M10A	5,600	0.82	30.0	D	M10A	6,310	0.92	37.0	E	-	-	-	-	-	NO	-
NB Outer	M10B	3,120	0.82	30.0	D	-	-	-	-	-	M10B	5,720	0.94	38.4	E	-	YES
SB	M11	6,690	1.07		F	M11A	4,560	0.67	23.0	C	M11B	4,190	0.71	25.0	C	NO	NO
SB Inner	M12A	3,660	0.54	18.4	C	M12A	4,560	0.67	23.0	C	-	-	-	-	-	YES	-
SB Outer	M12B	3,030	0.80	28.8	D	-	-	-	-	-	M12B	4,190	0.71	25.0	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	6,980	1.02	*	F	M13A	6,570	0.96	40.5	E	-	-	-	-	-	NO	-
NB Outer	M13B	3,900	1.02	*	F	-	-	-	-	-	M13B	6,030	0.99	44.2	E	-	NO
SB Inner	M14A	5,110	0.75	26.4	D	M14A	4,680	0.68	23.7	C	-	-	-	-	-	NO	-
SB Outer	M14B	2,710	0.75	26.4	D	-	-	-	-	-	M14B	4,000	0.68	23.7	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.52
2032 Level of Service Summary (Without N.J. Route 92) – Weekday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 Weekday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	4,450	0.69	23.8	C	M01	4,920	0.76	26.9	D	-	-	-	-	-	NO	-
NB	M01	4,450	0.69	23.8	C	M01A	2,590	0.38	13.0	B	M01B	2,330	0.38	13.0	B	NO	NO
SB	M02	4,180	0.65	22.4	C	M02	4,450	0.69	23.9	C	-	-	-	-	-	NO	-
SB	M02	4,180	0.65	22.4	C	M02A	2,260	0.33	11.3	B	M02B	2,200	0.36	12.3	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	5,510	0.85	31.7	D	M03A	3,320	0.49	16.7	B	M03B	3,020	0.49	16.7	B	NO	NO
SB	M04	5,260	0.82	30.0	D	M04A	2,950	0.43	14.8	B	M04B	2,840	0.43	16.0	B	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	5,670	0.87	33.4	D	M05A	3,460	0.51	17.3	B	M05B	3,110	0.51	17.3	B	NO	NO
SB	M06	5,650	0.88	34.1	D	M06A	3,240	0.47	16.3	B	M06B	3,180	0.53	18.0	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	6,260	0.97	42.0	E	M07A	4,070	0.60	20.4	C	M07B	3,720	0.61	20.8	C	NO	NO
SB	M08	6,430	1.00	*	F	M08A	4,330	0.63	21.8	C	M08B	4,080	0.66	22.9	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	6,580	1.03	*	F	M09A	4,280	0.63	21.5	C	M09B	3,950	0.65	22.4	C	NO	NO
NB Inner	M10A	4,220	0.62	21.2	C	M10A	4,280	0.63	21.5	C	-	-	-	-	-	NO	-
NB Outer	M10B	2,370	0.62	21.2	C	-	-	-	-	-	M10B	3,950	0.65	22.4	C	-	NO
SB	M11	7,580	1.18		F	M11A	5,200	0.76	27.0	D	M11B	4,840	0.79	28.4	D	NO	NO
SB Inner	M12A	4,410	0.64	22.2	C	M12A	5,200	0.76	27.0	D	-	-	-	-	-	YES	-
SB Outer	M12B	3,170	0.80	29.0	D	-	-	-	-	-	M12B	4,840	0.79	28.4	D	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	5,580	0.82	29.8	D	M13A	5,030	0.74	25.9	C	-	-	-	-	-	NO	-
NB Outer	M13B	3,110	0.81	29.3	D	-	-	-	-	-	M13B	4,640	0.76	27.1	D	-	NO
SB Inner	M14A	5,860	0.86	32.2	D	M14A	5,400	0.79	28.5	D	-	-	-	-	-	NO	-
SB Outer	M14B	3,320	0.86	32.2	D	-	-	-	-	-	M14B	4,860	0.79	28.5	D	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.53
2032 Level of Service Summary (Without N.J. Route 92) – Friday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 Friday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	5,010	0.76	27.1	D	M01	5,780	0.88	33.6	D	-	-	-	-	-	YES	-
NB	M01	5,010	0.76	27.1	D	M01A	3,000	0.44	15.0	B	M01B	2,780	0.44	15.0	B	NO	NO
SB	M02	5,510	0.85	31.5	D	M02	6,010	0.92	36.9	E	-	-	-	-	-	NO	-
SB	M02	5,510	0.85	31.5	D	M02A	3,080	0.45	15.4	B	M02B	2,930	0.47	16.1	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	6,290	0.95	39.8	E	M03A	3,950	0.58	19.8	C	M03B	3,680	0.58	19.8	C	NO	NO
SB	M04	6,840	1.05		F	M04A	4,060	0.59	20.3	C	M04B	3,850	0.59	21.3	C	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	6,670	1.01	*	F	M05A	4,270	0.62	21.5	C	M05B	3,940	0.62	21.4	C	NO	NO
SB	M06	7,370	1.13	*	F	M06A	4,720	0.69	24.0	C	M06B	4,480	0.72	25.2	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	6,960	1.06	*	F	M07A	4,670	0.68	23.7	C	M07B	4,330	0.69	24.0	C	NO	NO
SB	M08	7,550	1.16	*	F	M08A	5,170	0.76	26.8	D	M08B	4,810	0.77	27.4	D	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	7,600	1.17		F	M09A	4,990	0.73	25.6	C	M09B	4,620	0.74	26.3	D	NO	NO
NB Inner	M10A	4,790	0.70	24.4	C	M10A	4,990	0.73	25.6	C	-	-	-	-	-	NO	-
NB Outer	M10B	2,810	0.70	24.4	C	-	-	-	-	-	M10B	4,620	0.74	26.3	D	-	NO
SB	M11	8,470	1.30		F	M11A	5,820	0.85	31.9	D	M11B	5,390	0.86	32.6	D	NO	NO
SB Inner	M12A	4,720	0.69	24.0	C	M12A	5,820	0.85	31.9	D	-	-	-	-	-	YES	-
SB Outer	M12B	3,750	0.92	36.7	E	-	-	-	-	-	M12B	5,390	0.86	32.6	D	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	6,130	0.90	35.0	E	M13A	5,700	0.83	30.8	D	-	-	-	-	-	NO	-
NB Outer	M13B	3,530	0.89	34.7	D	-	-	-	-	-	M13B	5,260	0.85	32.0	D	-	NO
SB Inner	M14A	6,530	0.95	39.9	E	M14A	6,090	0.89	34.6	D	-	-	-	-	-	NO	-
SB Outer	M14B	3,770	0.95	39.9	E	-	-	-	-	-	M14B	5,560	0.89	34.6	D	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.54
2032 Level of Service Summary (Without N.J. Route 92) – Sunday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 Sunday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	6,680	1.00	45.0	E	M01	6,680	1.00	45.0	E	-	-	-	-	-	NO	-
NB	M01	6,680	1.00	45.0	E	M01A	3,420	0.50	17.1	B	M01B	3,270	0.50	17.1	B	NO	NO
SB	M02	6,470	0.99	44.1	E	M02	6,530	1.01		F	-	-	-	-	-	NO	-
SB	M02	6,470	0.99	44.1	E	M02A	3,320	0.49	16.6	B	M02B	3,210	0.49	16.7	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	7,930	1.18	*	F	M03A	4,030	0.59	20.2	C	M03B	3,890	0.59	20.3	C	NO	NO
SB	M04	8,940	1.33	*	F	M04A	4,550	0.66	23.0	C	M04B	4,400	0.66	22.9	C	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	8,230	1.23	*	F	M05A	4,190	0.61	21.1	C	M05B	4,040	0.61	21.1	C	NO	NO
SB	M06	9,090	1.35	*	F	M06A	4,610	0.67	23.3	C	M06B	4,480	0.68	23.4	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	8,630	1.29	*	F	M07A	4,380	0.64	22.0	C	M07B	4,250	0.65	22.3	C	NO	NO
SB	M08	8,570	1.27	*	F	M08A	4,350	0.64	21.9	C	M08B	4,220	0.64	22.0	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	8,560	1.28		F	M09A	4,340	0.63	21.9	C	M09B	4,220	0.64	22.1	C	NO	NO
NB Inner	M10A	5,240	0.77	27.3	D	M10A	4,340	0.63	21.9	C	-	-	-	-	-	NO	-
NB Outer	M10B	3,320	0.77	27.3	D	-	-	-	-	-	M10B	4,220	0.64	22.1	C	-	NO
SB	M11	8,550	1.27		F	M11A	4,340	0.63	21.8	C	M11B	4,210	0.64	22.0	C	NO	NO
SB Inner	M12A	4,970	0.73	25.5	C	M12A	4,340	0.63	21.8	C	-	-	-	-	-	NO	-
SB Outer	M12B	3,580	0.82	30.0	D	-	-	-	-	-	M12B	4,210	0.64	22.0	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	5,810	0.85	31.8	D	M13A	4,820	0.70	24.5	C	-	-	-	-	-	NO	-
NB Outer	M13B	3,680	0.85	31.8	D	-	-	-	-	-	M13B	4,670	0.71	24.8	C	-	NO
SB Inner	M14A	5,570	0.81	29.7	D	M14A	4,640	0.68	23.5	C	-	-	-	-	-	NO	-
SB Outer	M14B	3,560	0.81	29.8	D	-	-	-	-	-	M14B	4,490	0.68	23.5	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

analyzed peak hours, all mainline segments are projected to operate at LOS D or better except for the following:

- Between Interchange 5 and Interchange 6
  Mainline segment M01 (northbound) is projected to operate at LOS "E" during the Sunday PM peak hour.

  Mainline segment M02 (southbound) is projected to operate at LOS "E" during the Sunday PM peak hour.

- Between Interchange 6 and Interchange 7
  Mainline segment M03 (northbound) is projected to operate at LOS "E" during both the Weekday AM and Friday PM peak hours and at LOS "F" during the Sunday PM peak hour.

  Mainline segment M04 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and at LOS "F" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7 and Interchange 7A
  Mainline segment M05 (northbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Mainline segment M06 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and LOS "F" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7A and Interchange 8
  Mainline segment M07 (northbound) is projected to operate at LOS "E" during the Weekday PM peak hour and at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Mainline segment M08 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

- Between Interchange 8 and Interchange 8A
  Mainline segment M09 (northbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  Mainline segment M12 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  Mainline segment M14 (southbound) is projected to operate at LOS "E" during the Friday PM peak hour.

- Between Interchange 8A and Interchange 9
  Mainline segment M15 (northbound inner) is projected to operate at LOS "E" during the Friday PM peak hour.

  Mainline segment M17 (southbound inner) is projected to operate at LOS "E" during the Friday PM peak hour.

  Mainline segment M18 (southbound outer) is projected to operate at LOS "E" during the Friday PM peak hour.

Ramp Junctions (Merge and Diverge) Analysis

A total of 23 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis without construction of N.J. Route 92 is presented in Tables 4.55 through 4.58. During the analyzed peak hours, all ramps are projected to operate at LOS D or better except for the following:

- PHMTE Connection/Interchange 6
  Off-Ramp R03 (southbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

- Interchange 7
  On-Ramp R06 (northbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Off-Ramp R07 (southbound) is projected to operate at LOS "F" during both the Friday PM and Sunday PM peak hours.

  Off-Ramp R08 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and at LOS "F" during both the Friday PM and Sunday PM peak hours.

- Interchange 7A
  Off-Ramp R09 (southbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  On-Ramp R10 (northbound) is projected to operate at LOS "E" during the Weekday PM and at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Off-ramp R11 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  Off-ramp R12 (southbound) is projected to operate at LOS "F" during both the Friday PM and Sunday PM peak hours.

- Interchange 8
  Off-ramp R13 (northbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  On-ramp R14 (northbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  Off-ramp R15 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  On-ramp R16 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

- Interchange 8A
  Off-ramp R19 (northbound inner) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during the Weekday AM peak hour.

Table 4.55
2032 Level of Service Summary (Without N.J. Route 92) – Weekday AM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Ramps) Conditions

Ramp	2032 Weekday AM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	790	0.71	21.4	C	R01A	420	0.51	13.9	B	R01B	360	0.51	13.8	B	NO	NO
NB On	R02	1,560	0.98	28.2	D	R02A	1,140	0.59	2.9	A	R02B	1,010	0.59	3.0	A	NO	NO
SB Off	R03	2,330	1.06	32.0	F	R03A	1,490	0.59	5.9	A	R03B	1,330	0.62	6.9	A	NO	NO
SB On	R04	210	0.64	24.5	C	R04A	110	0.33	10.2	B	R04B	110	0.36	11.4	B	NO	NO
Interchange 7																	
NB Off	R05	310	0.92	27.5	C	R05A	240	0.60	15.5	B	R05B	210	0.60	15.7	B	NO	NO
NB On	R06	1,170	1.12	41.9	F	R06A	900	0.70	20.6	C	R06B	740	0.71	20.1	C	NO	NO
SB Off	R07	630	0.92	29.2	D	R07A	370	0.56	15.0	B	R07B	360	0.60	16.5	B	NO	NO
SB On	R08	1,080	1.04	37.9	E	R08A	660	0.58	16.3	B	R08B	590	0.61	17.5	B	NO	NO
Interchange 7A																	
NB Off	R09	450	1.01	31.9	F	R09A	420	0.69	19.8	B	R09B	360	0.70	20.0	B	NO	NO
NB On	R10	1,490	1.30	48.2	F	R10A	1,490	0.84	4.0	A	R10B	1,360	0.85	2.9	A	NO	NO
SB Off	R11	1,310	1.04	33.0	F	R11A	1,000	0.56	3.1	A	R11B	880	0.59	4.1	A	NO	NO
SB On	R12	490	0.93	32.5	D	R12A	380	0.51	15.4	B	R12B	360	0.55	16.8	B	NO	NO
Interchange 8																	
NB Off	R13	690	1.11	35.8	F	R13A	400	0.82	24.9	C	R13B	320	0.82	25.0	C	NO	NO
NB On	R14	1,460	1.40	52.0	F	R14A	1,250	1.00	31.3	D	R14B	1,160	1.02	31.1	D	NO	NO
SB Off	R15	1,070	1.03	32.8	F	R15A	1,100	0.75	22.1	C	R15B	1,000	0.79	23.7	C	NO	NO
SB On	R16	1,110	1.09	40.7	F	R16A	550	0.61	19.0	B	R16B	550	0.65	20.4	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	390	0.83	26.9	C	R17A	940	0.93	30.5	D	-	-	-	-	-	YES	-
NB Off-Out	R17B	220	0.89	28.6	D	-	-	-	-	-	R17B	760	0.93	30.2	D	-	NO
NB On-In	R18A	1,770	1.11	41.2	F	R18A	1,200	1.04	32.5	D	-	-	-	-	-	NO	-
NB On-Out	R18B	1,010	1.06	40.4	F	-	-	-	-	-	R18B	1,080	1.06	32.7	D	-	NO
SB Off-In	R19A	1,450	0.83	27.2	C	R19A	940	0.75	24.2	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	650	0.82	27.4	C	-	-	-	-	-	R19B	580	0.74	24.5	C	-	NO
SB On	R20	970	0.83	32.2	D	R20A	820	0.71	22.5	C	R20B	770	0.76	24.0	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.56
2032 Level of Service Summary (Without N.J. Route 92) – Weekday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 Weekday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	400	0.56	15.8	B	R01A	210	0.44	11.2	B	R01B	190	0.44	11.2	B	NO	NO
NB On	R02	1,460	0.89	25.0	C	R02A	950	0.52	0.4	A	R02B	870	0.52	0.4	A	NO	NO
SB Off	R03	1,370	0.79	21.9	C	R03A	830	0.43	(0.3)	A	R03B	780	0.46	0.9	A	NO	NO
SB On	R04	290	0.63	24.2	C	R04A	140	0.33	10.1	B	R04B	140	0.36	11.1	B	NO	NO
Interchange 7																	
NB Off	R05	240	0.85	25.0	C	R05A	170	0.54	13.3	B	R05B	160	0.54	13.3	B	NO	NO
NB On	R06	400	0.85	32.5	D	R06A	300	0.52	14.3	B	R06B	250	0.52	13.6	B	NO	NO
SB Off	R07	760	0.90	28.3	D	R07A	520	0.55	14.5	B	R07B	540	0.60	16.5	B	NO	NO
SB On	R08	370	0.80	29.8	D	R08A	220	0.44	11.5	B	R08B	190	0.47	12.7	B	NO	NO
Interchange 7A																	
NB Off	R09	580	0.88	27.0	C	R09A	420	0.57	15.3	B	R09B	330	0.57	15.1	B	NO	NO
NB On	R10	1,180	1.02	38.3	E	R10A	1,040	0.62	(3.8)	A	R10B	930	0.63	(4.7)	A	NO	NO
SB Off	R11	1,270	1.00	31.6	F	R11A	1,390	0.65	6.3	A	R11B	1,180	0.65	6.5	A	NO	NO
SB On	R12	490	0.88	30.9	D	R12A	300	0.48	14.5	B	R12B	280	0.53	16.2	B	NO	NO
Interchange 8																	
NB Off	R13	440	0.94	29.6	D	R13A	420	0.65	18.6	B	R13B	320	0.66	18.8	B	NO	NO
NB On	R14	760	1.03	38.9	F	R14A	630	0.66	19.4	B	R14B	560	0.69	19.6	B	NO	NO
SB Off	R15	1,640	1.12	36.0	F	R15A	1,180	0.83	25.1	C	R15B	1,060	0.85	25.9	C	NO	NO
SB On	R16	490	0.98	37.0	F	R16A	320	0.64	20.0	C	R16B	310	0.67	21.1	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	90	0.66	20.2	C	R17A	400	0.68	21.0	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	80	0.67	20.2	C	-	-	-	-	-	R17B	340	0.70	21.2	C	-	NO
NB On-In	R18A	1,450	0.89	33.4	D	R18A	1,150	0.81	24.5	C	-	-	-	-	-	NO	-
NB On-Out	R18B	820	0.84	32.5	D	-	-	-	-	-	R18B	1,030	0.84	24.8	C	-	NO
SB Off-In	R19A	1,450	0.91	30.2	D	R19A	910	0.83	27.3	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	820	0.93	31.9	D	-	-	-	-	-	R19B	690	0.83	27.8	C	-	NO
SB On	R20	670	0.84	32.5	D	R20A	700	0.79	25.4	C	R20B	670	0.81	26.0	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.57
2032 Level of Service Summary (Without N.J. Route 92) – Friday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 Friday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	470	0.63	18.3	B	R01A	230	0.50	13.5	B	R01B	220	0.50	13.5	B	NO	NO
NB On	R02	1,750	1.01	29.1	D	R02A	1,190	0.62	4.0	A	R02B	1,120	0.62	4.0	A	NO	NO
SB Off	R03	1,620	1.00	29.8	F	R03A	1,100	0.58	5.6	A	R03B	1,050	0.61	6.6	A	NO	NO
SB On	R04	290	0.81	30.7	D	R04A	130	0.44	14.2	B	R04B	120	0.46	14.9	B	NO	NO
Interchange 7																	
NB Off	R05	470	0.93	28.1	D	R05A	240	0.63	16.7	B	R05B	230	0.63	16.6	B	NO	NO
NB On	R06	860	1.02	38.3	F	R06A	550	0.65	19.1	B	R06B	480	0.66	18.4	B	NO	NO
SB Off	R07	910	1.06	34.3	F	R07A	890	0.76	22.4	C	R07B	830	0.78	23.3	C	NO	NO
SB On	R08	380	1.02	37.7	F	R08A	230	0.60	17.1	B	R08B	200	0.62	18.1	B	NO	NO
Interchange 7A																	
NB Off	R09	940	0.99	30.9	F	R09A	580	0.69	19.6	B	R09B	490	0.68	19.4	B	NO	NO
NB On	R10	1,230	1.11	41.3	F	R10A	970	0.69	(1.3)	A	R10B	880	0.70	(2.3)	A	NO	NO
SB Off	R11	790	1.07	34.1	F	R11A	840	0.67	7.0	A	R11B	700	0.66	6.8	A	NO	NO
SB On	R12	610	1.13	39.8	F	R12A	400	0.70	22.2	C	R12B	370	0.72	23.0	C	NO	NO
Interchange 8																	
NB Off	R13	390	1.00	31.7	F	R13A	300	0.72	21.2	C	R13B	250	0.73	21.4	C	NO	NO
NB On	R14	1,040	1.18	44.4	F	R14A	620	0.76	22.9	C	R14B	550	0.78	22.8	C	NO	NO
SB Off	R15	1,470	1.16	37.9	F	R15A	1,090	0.89	27.4	C	R15B	990	0.89	27.7	C	NO	NO
SB On	R16	560	1.13	42.5	F	R16A	430	0.76	24.5	C	R16B	410	0.77	24.6	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	220	0.73	23.1	C	R17A	460	0.77	24.4	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	140	0.76	23.7	C	-	-	-	-	-	R17B	400	0.78	24.2	C	-	NO
NB On-In	R18A	1,560	0.98	36.4	E	R18A	1,170	0.91	28.0	C	-	-	-	-	-	NO	-
NB On-Out	R18B	860	0.93	35.7	E	-	-	-	-	-	R18B	1,040	0.93	28.0	D	-	NO
SB Off-In	R19A	1,810	1.00	33.4	D	R19A	960	0.91	30.1	D	-	-	-	-	-	NO	-
SB Off-Out	R19B	1,080	1.04	36.0	F	-	-	-	-	-	R19B	830	0.91	30.9	D	-	NO
SB On	R20	1,050	0.96	36.7	E	R20A	690	0.88	28.5	D	R20B	660	0.87	28.1	D	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.58
2032 Level of Service Summary (Without N.J. Route 92) – Sunday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 Sunday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	910	0.86	27.1	C	R01A	470	0.57	16.2	B	R01B	440	0.57	16.1	B	NO	NO
NB On	R02	2,150	1.25	37.4	F	R02A	1,080	0.62	4.1	A	R02B	1,070	0.62	4.1	A	NO	NO
SB Off	R03	2,730	1.34	42.6	F	R03A	1,400	0.67	9.0	A	R03B	1,330	0.67	8.8	A	NO	NO
SB On	R04	260	0.92	34.5	D	R04A	170	0.48	15.5	B	R04B	150	0.48	15.6	B	NO	NO
Interchange 7																	
NB Off	R05	640	1.07	33.4	F	R05A	330	0.64	17.2	B	R05B	320	0.65	17.3	B	NO	NO
NB On	R06	950	1.23	45.8	F	R06A	490	0.64	18.5	B	R06B	460	0.64	17.9	B	NO	NO
SB Off	R07	680	1.15	37.9	F	R07A	330	0.72	20.9	C	R07B	350	0.72	21.1	C	NO	NO
SB On	R08	530	1.29	47.3	F	R08A	270	0.67	19.7	B	R08B	260	0.67	19.7	B	NO	NO
Interchange 7A																	
NB Off	R09	1,290	1.12	36.0	F	R09A	670	0.68	19.4	B	R09B	620	0.68	19.3	B	NO	NO
NB On	R10	1,680	1.35	49.7	F	R10A	860	0.64	(3.0)	A	R10B	830	0.65	(4.0)	A	NO	NO
SB Off	R11	880	1.13	36.4	F	R11A	440	0.53	1.7	A	R11B	430	0.53	1.8	A	NO	NO
SB On	R12	1,400	1.41	49.3	F	R12A	710	0.71	22.5	C	R12B	700	0.71	22.5	C	NO	NO
Interchange 8																	
NB Off	R13	580	1.12	36.4	F	R13A	290	0.69	19.9	B	R13B	290	0.69	20.1	C	NO	NO
NB On	R14	510	1.23	46.3	F	R14A	260	0.64	18.7	B	R14B	250	0.65	18.3	B	NO	NO
SB Off	R15	530	1.12	36.0	F	R15A	270	0.68	19.6	B	R15B	260	0.68	19.7	B	NO	NO
SB On	R16	540	1.23	46.2	F	R16A	270	0.63	20.0	B	R16B	260	0.64	20.1	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	160	0.79	25.1	C	R17A	130	0.68	20.9	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	100	0.84	26.4	C	-	-	-	-	-	R17B	130	0.68	20.6	C	-	NO
NB On-In	R18A	730	0.86	32.5	D	R18A	610	0.74	22.0	C	-	-	-	-	-	NO	-
NB On-Out	R18B	470	0.89	34.4	D	-	-	-	-	-	R18B	590	0.75	21.6	C	-	NO
SB Off-In	R19A	600	0.84	27.4	C	R19A	500	0.73	23.2	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	370	0.89	30.2	D	-	-	-	-	-	R19B	470	0.73	24.1	C	-	NO
SB On	R20	390	0.85	33.3	D	R20A	200	0.63	19.8	B	R20B	190	0.63	19.9	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

On-ramp R20 (northbound outer) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during the Weekday AM peak hour.

Off-ramp R22 (southbound outer) is projected to operate at LOS "F" during the Friday PM peak hour.

On-ramp R23 (southbound) is projected to operate at LOS "E" during the Friday PM peak hour.

Year 2032 Build (Without N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 30 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS analysis without construction of N.J. Route 92 is presented in Tables 4.51 through 4.54. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better except for the following:

- Between Interchange 5 and Interchange 6
  Mainline segment M01A (northbound inner) is projected to operate at LOS "E" during the Sunday PM peak hour.

  Mainline segment M02A (southbound inner) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during the Sunday PM peak hour.

- Between Interchange 8 and Interchange 8A
  Mainline segment M09A (northbound inner) is projected to operate at LOS "E" during the Weekday AM peak hour.

  Mainline segment M10 (northbound inner) is projected to operate at LOS "E" during the Weekday AM peak hour.

- Between Interchange 8A and Interchange 9
  Mainline segment M15 (northbound inner) is projected to operate at LOS "E" during the Weekday AM peak hour.

Ramp Junctions (Merge and Diverge) Analysis

A total of 40 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis without construction of N.J. Route 92 is presented in Tables 4.55 through 4.58. During the analyzed peak hours, all ramps are projected to operate at LOS D or better.

Year 2012 No-Build (With N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 18 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS

analysis is presented in Tables 4.59 through 4.62. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better except for the following:

- Between Interchange 6 and Interchange 7
  Mainline segment M04 (southbound) is projected to operate at LOS "E" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7 and Interchange 7A
  Mainline segment M06 (southbound) is projected to operate at LOS "E" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7A and Interchange 8
  Mainline segment M07 (northbound) is projected to operate at LOS "E" during both the Weekday AM and Sunday PM peak hours.

  Mainline segment M08 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour and at LOS "E" during the Sunday PM peak hour.

- Between Interchange 8 and Interchange 8A
  Mainline segment M09 (northbound) is projected to operate at LOS "E" during the Sunday PM peak hour and at LOS "F" during the Weekday AM peak hour.

  Mainline segment M12 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour and at LOS "E" during the Sunday PM peak hour.

Ramp Junctions (Merge and Diverge) Analysis

A total of 23 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis with construction of N.J. Route 92 is presented in Tables 4.63 through 4.66. During the analyzed peak hours, all ramps are projected to operate at LOS D or better except for the following:

- Interchange 7A
  On-Ramp R10 (northbound) is projected to operate at LOS "E" during both the Weekday AM and Sunday PM peak hours.

  Off-ramp R11 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour.

  Off-ramp R12 (southbound) is projected to operate at LOS "E" during the Friday PM peak hour.

- Interchange 8
  On-ramp R14 (northbound) is projected to operate at LOS "E" during the Sunday PM peak hour and at LOS "F" during the Weekday AM peak hour.

  Off-ramp R15 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour.

  On-ramp R16 (southbound) is projected to operate at LOS "F" during the Friday PM peak hour.

Table 4.59
2012 Level of Service Summary (With N.J. Route 92) – Weekday AM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 (With N.J. Route 92) Weekday AM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	3,820	0.60	20.5	C	M01	4,030	0.63	21.7	C	-	-	-	-	-	NO	-
NB	M01	3,820	0.60	20.5	C	M01A	2,160	0.32	10.8	A	M01B	1,870	0.32	10.8	A	NO	NO
SB	M02	2,580	0.41	14.1	B	M02	2,520	0.40	13.7	B	-	-	-	-	-	NO	-
SB	M02	2,580	0.41	14.1	B	M02A	1,270	0.19	6.4	A	M02B	1,240	0.21	7.3	A	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	4,320	0.68	23.6	C	M03A	2,430	0.35	12.2	B	M03B	2,150	0.37	12.5	B	NO	NO
SB	M04	3,940	0.63	21.7	C	M04A	2,040	0.30	10.2	A	M04B	1,990	0.30	11.8	A	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	4,830	0.76	27.1	D	M05A	2,710	0.40	13.6	B	M05B	2,410	0.41	14.2	B	NO	NO
SB	M06	3,800	0.61	20.9	C	M06A	1,910	0.28	9.6	A	M06B	1,920	0.33	11.4	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	5,820	0.92	36.7	E	M07A	3,570	0.52	17.9	B	M07B	3,200	0.54	18.5	C	NO	NO
SB	M08	4,220	0.68	23.4	C	M08A	2,200	0.32	11.0	B	M08B	2,170	0.38	13.0	B	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	6,610	1.04		F	M09A	4,140	0.61	20.8	C	M09B	3,770	0.63	21.6	C	NO	NO
NB Inner	M10A	4,250	0.62	21.3	C	M10A	4,140	0.61	20.8	C	-	-	-	-	-	NO	-
NB Outer	M10B	2,360	0.62	21.4	C	-	-	-	-	-	M10B	3,770	0.63	21.6	C	-	NO
SB	M11	4,240	0.68	23.7	C	M11A	1,950	0.29	9.8	A	M11B	2,110	0.38	13.0	B	NO	NO
SB Inner	M12A	2,370	0.35	11.9	B	M12A	1,950	0.29	9.8	A	-	-	-	-	-	NO	-
SB Outer	M12B	1,870	0.51	17.3	B	-	-	-	-	-	M12B	2,110	0.38	13.0	B	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	5,230	0.76	27.2	D	M13A	4,660	0.68	23.6	C	-	-	-	-	-	NO	-
NB Outer	M13B	2,910	0.76	26.8	D	-	-	-	-	-	M13B	4,250	0.70	24.5	C	-	NO
SB Inner	M14A	4,050	0.59	20.3	C	M14A	3,240	0.47	16.2	B	-	-	-	-	-	NO	-
SB Outer	M14B	2,180	0.59	20.3	C	-	-	-	-	-	M14B	2,790	0.47	16.2	B	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.60
2012 Level of Service Summary (With N.J. Route 92) – Weekday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 (With N.J. Route 92) Weekday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	2,820	0.44	15.0	B	M01	3,030	0.47	16.1	B	-	-	-	-	-	NO	-
NB	M01	2,820	0.44	15.0	B	M01A	1,610	0.24	8.1	A	M01B	1,420	0.24	8.1	A	NO	NO
SB	M02	2,960	0.47	16.0	B	M02	3,170	0.50	17.1	B	-	-	-	-	-	NO	-
SB	M02	2,960	0.47	16.0	B	M02A	1,570	0.23	7.9	A	M02B	1,600	0.27	9.2	A	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	3,520	0.55	18.8	C	M03A	2,000	0.29	10.0	A	M03B	1,780	0.29	10.1	A	NO	NO
SB	M04	4,040	0.64	21.9	C	M04A	2,110	0.31	10.6	A	M04B	2,130	0.31	12.3	A	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	3,760	0.59	20.2	C	M05A	2,100	0.31	10.5	A	M05B	1,850	0.31	10.6	A	NO	NO
SB	M06	4,430	0.70	24.4	C	M06A	2,250	0.33	11.3	B	M06B	2,290	0.39	13.2	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	4,330	0.68	23.6	C	M07A	2,510	0.37	12.6	B	M07B	2,260	0.38	13.0	B	NO	NO
SB	M08	5,230	0.82	30.2	D	M08A	3,030	0.44	15.2	B	M08B	2,930	0.49	16.7	B	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	4,390	0.69	24.0	C	M09A	2,560	0.37	12.8	B	M09B	2,370	0.40	13.6	B	NO	NO
NB Inner	M10A	2,830	0.41	14.2	B	M10A	2,560	0.37	12.8	B	-	-	-	-	-	NO	-
NB Outer	M10B	1,560	0.41	14.2	B	-	-	-	-	-	M10B	2,370	0.40	13.6	B	-	NO
SB	M11	5,880	0.92	36.6	E	M11A	3,520	0.51	17.6	B	M11B	3,270	0.54	18.6	C	NO	NO
SB Inner	M12A	3,440	0.50	17.2	B	M12A	3,520	0.51	17.6	B	-	-	-	-	-	NO	-
SB Outer	M12B	2,440	0.62	21.4	C	-	-	-	-	-	M12B	3,270	0.54	18.6	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	4,050	0.59	20.3	C	M13A	3,590	0.52	18.0	B	-	-	-	-	-	NO	-
NB Outer	M13B	2,230	0.58	20.0	C	-	-	-	-	-	M13B	3,260	0.54	18.5	C	-	NO
SB Inner	M14A	4,570	0.67	23.1	C	M14A	4,000	0.58	20.1	C	-	-	-	-	-	NO	-
SB Outer	M14B	2,590	0.67	23.1	C	-	-	-	-	-	M14B	3,590	0.58	20.1	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.61
2012 Level of Service Summary (With N.J. Route 92) – Friday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 (With N.J. Route 92) Friday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	3,890	0.59	20.2	C	M01	4,260	0.65	22.4	C	-	-	-	-	-	NO	-
NB	M01	3,890	0.59	20.2	C	M01A	2,220	0.32	11.1	B	M01B	2,040	0.32	11.1	B	NO	NO
SB	M02	4,520	0.69	24.1	C	M02	4,920	0.75	26.6	D	-	-	-	-	-	NO	-
SB	M02	4,520	0.69	24.1	C	M02A	2,600	0.38	13.0	B	M02B	2,330	0.37	12.7	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	4,910	0.75	26.3	D	M03A	2,810	0.41	14.1	B	M03B	2,590	0.41	14.0	B	NO	NO
SB	M04	6,010	0.93	37.3	E	M04A	3,460	0.51	17.3	B	M04B	3,150	0.51	17.4	B	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	5,080	0.77	27.6	D	M05A	2,940	0.43	14.8	B	M05B	2,700	0.43	14.7	B	NO	NO
SB	M06	6,470	1.00	44.9	E	M06A	3,730	0.55	18.7	C	M06B	3,430	0.55	18.9	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	5,400	0.83	30.7	D	M07A	3,230	0.47	16.2	B	M07B	2,980	0.48	16.5	B	NO	NO
SB	M08	6,910	1.07		F	M08A	3,930	0.57	19.7	C	M08B	3,680	0.60	20.5	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	5,610	0.86	32.7	D	M09A	3,380	0.49	16.9	B	M09B	3,140	0.50	17.3	B	NO	NO
NB Inner	M10A	3,540	0.52	17.7	B	M10A	3,380	0.49	16.9	B	-	-	-	-	-	NO	-
NB Outer	M10B	2,070	0.52	17.7	B	-	-	-	-	-	M10B	3,140	0.50	17.3	B	-	NO
SB	M11	7,070	1.21		F	M11A	4,240	0.62	21.3	C	M11B	3,910	0.63	21.8	C	NO	NO
SB Inner	M12A	4,090	0.60	20.5	C	M12A	4,240	0.62	21.3	C	-	-	-	-	-	NO	-
SB Outer	M12B	2,980	0.74	26.0	C	-	-	-	-	-	M12B	3,910	0.63	21.8	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	4,800	0.70	24.5	C	M13A	4,260	0.62	21.4	C	-	-	-	-	-	NO	-
NB Outer	M13B	2,760	0.69	24.1	C	-	-	-	-	-	M13B	3,910	0.63	21.7	C	-	NO
SB Inner	M14A	5,640	0.82	30.3	D	M14A	4,710	0.69	23.9	C	-	-	-	-	-	NO	-
SB Outer	M14B	3,270	0.82	30.3	D	-	-	-	-	-	M14B	4,270	0.69	23.9	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.62
2012 Level of Service Summary (With N.J. Route 92) – Sunday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2012 (With N.J. Route 92) Sunday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	4,530	0.68	23.5	C	M01	4,510	0.67	23.3	C	-	-	-	-	-	NO	-
NB	M01	4,530	0.68	23.5	C	M01A	2,310	0.34	11.6	B	M01B	2,200	0.34	11.6	B	NO	NO
SB	M02	4,710	0.70	24.5	C	M02	4,600	0.71	24.8	C	-	-	-	-	-	NO	-
SB	M02	4,710	0.70	24.5	C	M02A	2,340	0.34	11.7	B	M02B	2,260	0.35	11.8	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	5,390	0.80	29.1	D	M03A	2,720	0.40	13.6	B	M03B	2,620	0.40	13.6	B	NO	NO
SB	M04	6,270	0.93	37.8	E	M04A	3,300	0.48	16.5	B	M04B	3,200	0.48	16.5	B	NO	NO
NB	M05	5,720	0.85	32.0	D	M05A	2,880	0.42	14.4	B	M05B	2,770	0.42	14.5	B	NO	NO
SB	M06	6,430	0.95	40.0	E	M06A	3,400	0.50	17.0	B	M06B	3,320	0.50	17.1	B	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	6,270	0.94	38.3	E	M07A	3,120	0.46	15.7	B	M07B	3,020	0.46	15.8	B	NO	NO
SB	M08	6,240	0.93	37.4	E	M08A	3,320	0.49	16.6	B	M08B	3,240	0.49	16.8	B	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	6,440	0.96	40.6	E	M09A	3,210	0.47	16.1	B	M09B	3,090	0.47	16.2	B	NO	NO
NB Inner	M10A	3,940	0.58	19.8	C	M10A	3,210	0.47	16.1	B	-	-	-	-	-	NO	-
NB Outer	M10B	2,500	0.58	19.8	C	-	-	-	-	-	M10B	3,090	0.47	16.2	B	-	NO
SB	M11	6,250	0.93	37.6	E	M11A	3,310	0.48	16.6	B	M11B	3,240	0.49	16.8	B	NO	NO
SB Inner	M12A	3,670	0.54	18.4	C	M12A	3,310	0.48	16.6	B	-	-	-	-	-	NO	-
SB Outer	M12B	2,580	0.59	20.1	C	-	-	-	-	-	M12B	3,240	0.49	16.8	B	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	4,330	0.63	21.8	C	M13A	3,560	0.52	17.9	B	-	-	-	-	-	NO	-
NB Outer	M13B	2,750	0.64	21.9	C	-	-	-	-	-	M13B	3,450	0.52	18.0	B	-	NO
SB Inner	M14A	4,220	0.62	21.2	C	M14A	3,660	0.54	18.4	C	-	-	-	-	-	NO	-
SB Outer	M14B	2,720	0.62	21.2	C	-	-	-	-	-	M14B	3,550	0.54	18.4	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.63
2012 Level of Service Summary (With N.J. Route 92) – Weekday AM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Ramps) Conditions

Ramp	2012 (With N.J. Route 92) Weekday AM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	740	0.54	15.2	B	R01A	430	0.39	9.2	A	R01B	320	0.38	9.0	A	NO	NO
NB On	R02	1,250	0.73	19.3	B	R02A	700	0.38	(4.4)	A	R02B	600	0.39	(4.1)	A	NO	NO
SB Off	R03	1,580	0.69	18.1	B	R03A	860	0.33	(3.8)	A	R03B	830	0.38	(2.0)	A	NO	NO
SB On	R04	220	0.41	16.2	B	R04A	90	0.19	5.1	A	R04B	90	0.21	6.0	A	NO	NO
Interchange 7																	
NB Off	R05	330	0.72	20.2	C	R05A	190	0.41	8.5	A	R05B	140	0.42	8.8	A	NO	NO
NB On	R06	840	0.79	30.2	D	R06A	470	0.43	10.9	B	R06B	400	0.44	10.8	B	NO	NO
SB Off	R07	460	0.67	19.6	B	R07A	230	0.34	6.5	A	R07B	260	0.40	8.8	A	NO	NO
SB On	R08	600	0.65	24.2	C	R08A	370	0.32	7.3	A	R08B	320	0.37	8.8	A	NO	NO
Interchange 7A																	
NB Off	R09	480	0.80	23.8	C	R09A	320	0.46	11.1	B	R09B	270	0.48	11.7	B	NO	NO
NB On	R10	1,470	1.00	37.3	E	R10A	1,180	0.57	(5.6)	A	R10B	1,060	0.59	(6.3)	A	NO	NO
SB Off	R11	970	0.75	22.3	C	R11A	630	0.32	(6.2)	A	R11B	550	0.36	(4.5)	A	NO	NO
SB On	R12	550	0.63	21.8	C	R12A	330	0.30	7.8	A	R12B	310	0.35	9.7	A	NO	NO
Interchange 8																	
NB Off	R13	460	0.91	28.3	D	R13A	250	0.58	15.8	B	R13B	210	0.60	16.4	B	NO	NO
NB On	R14	1,260	1.08	40.5	F	R14A	830	0.66	19.2	B	R14B	770	0.68	19.3	B	NO	NO
SB Off	R15	430	0.73	21.5	C	R15A	0	0.33	6.3	A	R15B	170	0.44	10.5	B	NO	NO
SB On	R16	400	0.67	26.0	C	R16A	250	0.33	9.1	A	R16B	230	0.39	11.0	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	260	0.67	20.6	C	R17A	400	0.66	20.4	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	170	0.68	20.4	C	-	-	-	-	-	R17B	350	0.68	20.5	C	-	NO
NB On-In	R18A	1,240	0.82	31.1	D	R18A	910	0.74	22.0	C	-	-	-	-	-	NO	-
NB On-Out	R18B	720	0.79	30.8	D	-	-	-	-	-	R18B	830	0.77	22.2	C	-	NO
SB Off-In	R19A	1,680	0.73	23.2	C	R19A	1,540	0.61	18.9	B	-	-	-	-	-	NO	-
SB Off-Out	R19B	710	0.65	21.1	C	-	-	-	-	-	R19B	900	0.57	18.1	B	-	NO
SB On	R20	400	0.53	21.6	C	R20A	260	0.30	7.8	A	R20B	220	0.39	11.1	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.64
2012 Level of Service Summary (With N.J. Route 92) – Weekday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Ramps) Conditions

Ramp	2012 (With N.J. Route 92) Weekday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	340	0.37	8.6	A	R01A	190	0.29	5.4	A	R01B	160	0.29	5.4	A	NO	NO
NB On	R02	1,030	0.59	14.4	B	R02A	580	0.31	(6.8)	A	R02B	520	0.31	(6.7)	A	NO	NO
SB Off	R03	1,290	0.65	16.6	B	R03A	630	0.31	(4.7)	A	R03B	610	0.36	(3.0)	A	NO	NO
SB On	R04	210	0.45	17.9	B	R04A	90	0.23	6.5	A	R04B	90	0.26	7.9	A	NO	NO
Interchange 7																	
NB Off	R05	150	0.60	15.5	B	R05A	110	0.34	5.8	A	R05B	100	0.35	5.9	A	NO	NO
NB On	R06	390	0.59	23.0	C	R06A	210	0.32	7.1	A	R06B	170	0.32	6.5	A	NO	NO
SB Off	R07	710	0.76	23.0	C	R07A	320	0.39	8.7	A	R07B	320	0.45	10.9	B	NO	NO
SB On	R08	320	0.63	23.6	C	R08A	180	0.32	7.1	A	R08B	150	0.36	8.8	A	NO	NO
Interchange 7A																	
NB Off	R09	480	0.65	18.2	B	R09A	330	0.37	7.7	A	R09B	240	0.37	7.6	A	NO	NO
NB On	R10	1,050	0.74	28.1	D	R10A	730	0.39	(11.9)	A	R10B	640	0.40	(12.8)	A	NO	NO
SB Off	R11	1,280	0.88	27.2	C	R11A	1,030	0.46	(0.8)	A	R11B	870	0.48	0.0	A	NO	NO
SB On	R12	470	0.71	24.7	C	R12A	260	0.34	9.4	A	R12B	230	0.39	11.3	B	NO	NO
Interchange 8																	
NB Off	R13	370	0.72	21.3	C	R13A	220	0.43	10.0	B	R13B	150	0.44	10.4	B	NO	NO
NB On	R14	430	0.68	26.6	C	R14A	280	0.39	9.7	A	R14B	260	0.41	9.7	A	NO	NO
SB Off	R15	970	0.93	28.9	D	R15A	740	0.60	16.4	B	R15B	580	0.61	17.1	B	NO	NO
SB On	R16	320	0.79	30.6	D	R16A	250	0.45	13.2	B	R16B	240	0.49	14.8	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	120	0.47	13.1	B	R17A	140	0.43	11.7	B	-	-	-	-	-	NO	-
NB Off-Out	R17B	90	0.45	11.9	B	-	-	-	-	-	R17B	150	0.45	12.0	B	-	NO
NB On-In	R18A	1,340	0.67	25.7	C	R18A	1,170	0.61	17.2	B	-	-	-	-	-	NO	-
NB On-Out	R18B	760	0.61	24.3	C	-	-	-	-	-	R18B	1,040	0.63	17.1	B	-	NO
SB Off-In	R19A	1,140	0.75	24.2	C	R19A	830	0.66	20.9	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	640	0.73	24.2	C	-	-	-	-	-	R19B	630	0.66	21.4	C	-	NO
SB On	R20	500	0.65	25.9	C	R20A	350	0.53	16.0	B	R20B	310	0.55	16.9	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

.

Table 4.65
2012 Level of Service Summary (With N.J. Route 92) – Friday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2012 (With N.J. Route 92) Friday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	400	0.49	13.1	B	R01A	210	0.38	9.1	A	R01B	200	0.38	9.1	A	NO	NO
NB On	R02	1,420	0.80	21.7	C	R02A	800	0.44	(2.4)	A	R02B	750	0.44	(2.4)	A	NO	NO
SB Off	R03	1,800	0.93	27.2	C	R03A	910	0.49	2.2	A	R03B	880	0.50	2.6	A	NO	NO
SB On	R04	300	0.67	25.8	C	R04A	50	0.37	11.6	B	R04B	50	0.36	11.3	B	NO	NO
Interchange 7																	
NB Off	R05	340	0.78	22.2	C	R05A	180	0.47	10.5	B	R05B	170	0.47	10.5	B	NO	NO
NB On	R06	510	0.77	29.5	D	R06A	320	0.45	11.7	B	R06B	280	0.45	11.0	B	NO	NO
SB Off	R07	780	0.98	31.2	D	R07A	460	0.61	16.9	B	R07B	440	0.62	17.2	B	NO	NO
SB On	R08	320	0.90	33.3	D	R08A	180	0.51	14.0	B	R08B	160	0.51	14.1	B	NO	NO
Interchange 7A																	
NB Off	R09	790	0.82	24.5	C	R09A	480	0.50	12.7	B	R09B	390	0.50	12.5	B	NO	NO
NB On	R10	1,100	0.88	33.3	D	R10A	760	0.49	(8.5)	A	R10B	680	0.50	(9.5)	A	NO	NO
SB Off	R11	1,080	1.03	32.7	F	R11A	580	0.50	0.6	A	R11B	600	0.53	1.8	A	NO	NO
SB On	R12	640	1.01	35.3	E	R12A	370	0.56	17.1	B	R12B	350	0.56	17.4	B	NO	NO
Interchange 8																	
NB Off	R13	240	0.84	25.6	C	R13A	160	0.53	13.9	B	R13B	130	0.54	14.2	B	NO	NO
NB On	R14	450	0.84	32.4	D	R14A	310	0.51	13.9	B	R14B	290	0.52	13.6	B	NO	NO
SB Off	R15	640	1.02	32.5	F	R15A	630	0.68	19.7	B	R15B	540	0.69	20.1	C	NO	NO
SB On	R16	480	1.04	39.2	F	R16A	320	0.58	18.0	B	R16B	300	0.60	18.8	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	100	0.57	16.9	B	R17A	230	0.55	16.2	B	-	-	-	-	-	NO	-
NB Off-Out	R17B	90	0.56	16.2	B	-	-	-	-	-	R17B	220	0.56	16.1	B	-	NO
NB On-In	R18A	1,360	0.78	29.4	D	R18A	1,110	0.70	20.5	C	-	-	-	-	-	NO	-
NB On-Out	R18B	780	0.72	28.4	D	-	-	-	-	-	R18B	990	0.71	20.1	C	-	NO
SB Off-In	R19A	1,550	0.90	29.6	D	R19A	850	0.75	24.2	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	910	0.90	30.6	D	-	-	-	-	-	R19B	710	0.75	24.9	C	-	NO
SB On	R20	620	0.77	30.2	D	R20A	380	0.63	19.7	B	R20B	350	0.64	20.2	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.* = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.66
2012 Level of Service Summary (With N.J. Route 92) – Sunday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2012 (With N.J. Route 92) Sunday PM Peak Hour															Significant Impact From No-Build?	
	No-Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	510	0.57	16.1	B	R01A	280	0.40	9.7	A	R01B	260	0.40	9.7	A	NO	NO
NB On	R02	1,370	0.84	23.2	C	R02A	690	0.42	(3.2)	A	R02B	680	0.42	(3.2)	A	NO	NO
SB Off	R03	1,710	0.91	26.5	C	R03A	1,050	0.49	2.2	A	R03B	1,010	0.49	2.2	A	NO	NO
SB On	R04	150	0.67	25.6	C	R04A	100	0.33	10.4	B	R04B	70	0.34	10.5	B	NO	NO
Interchange 7																	
NB Off	R05	350	0.82	23.9	C	R05A	210	0.46	10.1	B	R05B	200	0.46	10.1	B	NO	NO
NB On	R06	680	0.86	32.6	D	R06A	370	0.44	11.5	B	R06B	350	0.44	10.9	B	NO	NO
SB Off	R07	470	0.93	29.5	D	R07A	290	0.56	14.9	B	R07B	290	0.56	15.0	B	NO	NO
SB On	R08	310	0.90	33.4	D	R08A	180	0.48	13.1	B	R08B	170	0.48	13.2	B	NO	NO
Interchange 7A																	
NB Off	R09	770	0.87	26.7	C	R09A	360	0.49	12.1	B	R09B	340	0.49	12.1	B	NO	NO
NB On	R10	1,320	0.99	37.2	E	R10A	610	0.46	(9.5)	A	R10B	590	0.46	(10.6)	A	NO	NO
SB Off	R11	660	0.92	28.7	D	R11A	320	0.40	(3.1)	A	R11B	320	0.41	(2.9)	A	NO	NO
SB On	R12	850	0.98	34.3	D	R12A	410	0.51	15.6	B	R12B	400	0.52	15.7	B	NO	NO
Interchange 8																	
NB Off	R13	300	0.91	28.5	D	R13A	130	0.51	13.3	B	R13B	130	0.52	13.4	B	NO	NO
NB On	R14	460	0.93	35.6	E	R14A	210	0.47	12.8	B	R14B	200	0.48	12.2	B	NO	NO
SB Off	R15	360	0.91	28.3	D	R15A	160	0.54	14.2	B	R15B	160	0.54	14.4	B	NO	NO
SB On	R16	350	0.89	34.1	D	R16A	170	0.48	14.5	B	R16B	160	0.49	14.7	B	NO	NO
Interchange 8A																	
NB Off-In	R17A	110	0.62	18.9	B	R17A	90	0.52	15.1	B	-	-	-	-	-	NO	-
NB Off-Out	R17B	70	0.63	18.6	B	-	-	-	-	-	R17B	80	0.52	14.6	B	-	NO
NB On-In	R18A	500	0.63	24.7	C	R18A	450	0.54	15.2	B	-	-	-	-	-	NO	-
NB On-Out	R18B	320	0.66	26.5	C	-	-	-	-	-	R18B	430	0.55	14.7	B	-	NO
SB Off-In	R19A	550	0.68	21.4	C	R19A	460	0.60	18.4	B	-	-	-	-	-	NO	-
SB Off-Out	R19B	330	0.67	22.1	C	-	-	-	-	-	R19B	420	0.60	19.3	B	-	NO
SB On	R20	190	0.61	24.7	C	R20A	110	0.48	14.3	B	R20B	100	0.48	14.5	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Year 2012 Build (With N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 30 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS analysis with construction of N.J. Route 92 is presented in Tables 4.59 through 4.62. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better.

Ramp Junctions (Merge and Diverge) Analysis

A total of 40 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis with construction of N.J. Route 92 is presented in Tables 4.63 through 4.66. During the analyzed peak hours, all ramps are projected to operate at LOS D or better.

Year 2032 No-Build (With N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 18 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS analysis with construction of N.J. Route 92 is presented in Tables 4.67 through 4.70. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better except for the following:

- Between Interchange 5 and Interchange 6
  Mainline segment M01 (northbound) is projected to operate at LOS "E" during the Sunday PM peak hour.

  Mainline segment M02 (southbound) is projected to operate at LOS "F" during the Sunday PM peak hour.

- Between Interchange 6 and Interchange 7
  Mainline segment M03 (northbound) is projected to operate at LOS "E" during both the Weekday AM and Friday PM peak hours and at LOS "F" during the Sunday PM peak hour.

  Mainline segment M04 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and at LOS "F" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 7 and Interchange 7A
  Mainline segment M05 (northbound) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during both the Weekday AM and Sunday PM peak hours.

  Mainline segment M06 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and LOS "F" during both the Friday PM and Sunday PM peak hours.

Table 4.67
2032 Level of Service Summary (With N.J. Route 92) – Weekday AM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 (With N.J. Route 92) Weekday AM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	5,25	0.81	29.5	D	M01	5,76	0.89	34.5	D	-	-	-	-	-	NO	-
NB	M01	5,25	0.81	29.5	D	M01A	3,04	0.44	15.2	B	M01B	2,720	0.44	15.2	B	NO	NO
SB	M02	4,24	0.66	22.9	C	M02	4,52	0.71	24.6	C	-	-	-	-	-	NO	-
SB	M02	4,24	0.66	22.9	C	M02A	2,27	0.33	11.4	B	M02B	2,240	0.37	12.8	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	6,02	0.93	37.9	E	M03A	3,77	0.55	18.9	C	M03B	3,390	0.56	19.1	C	NO	NO
SB	M04	6,35	1.00	44.4	E	M04A	3,63	0.53	18.2	C	M04B	3,470	0.53	19.8	C	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	6,84	1.07	*	F	M05A	4,42	0.65	22.3	C	M05B	3,910	0.65	22.5	C	NO	NO
SB	M06	5,91	0.93	37.7	E	M06A	3,34	0.49	16.8	B	M06B	3,260	0.54	18.6	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	7,77	1.22	*	F	M07A	5,48	0.80	29.1	D	M07B	4,900	0.81	29.5	D	NO	NO
SB	M08	6,62	1.04	*	F	M08A	3,88	0.57	19.4	C	M08B	3,730	0.62	21.5	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	8,76	1.37	*	F	M09A	6,32	0.92	37.2	E	M09B	5,730	0.94	38.6	E	NO	NO
NB Inner	M10A	5,62	0.82	30.2	D	M10A	6,32	0.92	37.2	E	-	-	-	-	-	NO	-
NB Outer	M10B	3,14	0.82	30.2	D	-	-	-	-	-	M10B	5,730	0.94	38.6	E	-	YES
SB	M11	6,03	0.97	41.1	E	M11A	3,67	0.54	18.4	C	M11B	3,640	0.63	21.6	C	NO	NO
SB Inner	M12A	3,16	0.46	15.8	B	M12A	3,67	0.54	18.4	C	-	-	-	-	-	NO	-
SB Outer	M12B	2,87	0.76	26.8	D	-	-	-	-	-	M12B	3,640	0.63	21.6	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	7,09	1.04	*	F	M13A	6,63	0.97	41.4	E	-	-	-	-	-	NO	-
NB Outer	M13B	3,98	1.04	*	F	-	-	-	-	-	M13B	6,110	1.01		F	-	NO
SB Inner	M14A	5,90	0.86	32.7	D	M14A	4,90	0.72	25.1	C	-	-	-	-	-	NO	-
SB Outer	M14B	3,18	0.86	32.7	D	-	-	-	-	-	M14B	4,240	0.72	25.1	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.68
2032 Level of Service Summary (With N.J. Route 92) – Weekday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 (With N.J. Route 92) Weekday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	4,32	0.67	23.1	C	M01	4,88	0.75	26.5	D	-	-	-	-	-	NO	-
NB	M01	4,32	0.67	23.1	C	M01A	2,56	0.37	12.9	B	M01B	2,320	0.38	12.9	B	NO	NO
SB	M02	4,17	0.65	22.2	C	M02	4,49	0.69	24.2	C	-	-	-	-	-	NO	-
SB	M02	4,17	0.65	22.2	C	M02A	2,28	0.33	11.4	B	M02B	2,210	0.36	12.4	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	5,42	0.83	30.9	D	M03A	3,31	0.48	16.6	B	M03B	3,000	0.48	16.6	B	NO	NO
SB	M04	5,28	0.82	30.0	D	M04A	2,98	0.44	15.0	B	M04B	2,870	0.44	16.1	B	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	5,59	0.86	32.6	D	M05A	3,46	0.51	17.3	B	M05B	3,110	0.50	17.3	B	NO	NO
SB	M06	5,63	0.88	33.5	D	M06A	3,27	0.48	16.4	B	M06B	3,210	0.53	18.2	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	6,25	0.97	41.8	E	M07A	4,05	0.59	20.3	C	M07B	3,690	0.60	20.6	C	NO	NO
SB	M08	6,54	1.02	*	F	M08A	4,38	0.64	22.1	C	M08B	4,160	0.68	23.5	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	6,40	1.00	44.7	E	M09A	4,11	0.60	20.6	C	M09B	3,810	0.63	21.5	C	NO	NO
NB Inner	M10A	4,09	0.60	20.5	C	M10A	4,11	0.60	20.6	C	-	-	-	-	-	NO	-
NB Outer	M10B	2,30	0.60	20.6	C	-	-	-	-	-	M10B	3,810	0.63	21.5	C	-	NO
SB	M11	7,49	1.16		F	M11A	5,20	0.76	27.0	D	M11B	4,810	0.78	28.1	D	NO	NO
SB Inner	M12A	4,33	0.63	21.8	C	M12A	5,20	0.76	27.0	D	-	-	-	-	-	YES	-
SB Outer	M12B	3,16	0.79	28.3	D	-	-	-	-	-	M12B	4,810	0.78	28.1	D	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	5,93	0.87	33.0	D	M13A	5,29	0.77	27.7	D	-	-	-	-	-	NO	-
NB Outer	M13B	3,30	0.85	32.1	D	-	-	-	-	-	M13B	4,870	0.80	29.0	D	-	NO
SB Inner	M14A	6,07	0.89	34.3	D	M14A	5,46	0.80	28.9	D	-	-	-	-	-	NO	-
SB Outer	M14B	3,43	0.89	34.3	D	-	-	-	-	-	M14B	4,910	0.80	28.9	D	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.69
2032 Level of Service Summary (With N.J. Route 92) – Friday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 (With N.J. Route 92) Friday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	5,11	0.78	27.9	D	M01	5,49	0.84	31.0	D	-	-	-	-	-	NO	-
NB	M01	5,11	0.78	27.9	D	M01A	2,86	0.42	14.3	B	M01B	2,630	0.42	14.3	B	NO	NO
SB	M02	5,66	0.87	33.0	D	M02	5,99	0.92	36.5	E	-	-	-	-	-	NO	-
SB	M02	5,66	0.87	33.0	D	M02A	3,09	0.45	15.5	B	M02B	2,910	0.46	15.9	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	6,43	0.97	42.0	E	M03A	3,77	0.55	18.9	C	M03B	3,500	0.55	18.9	C	NO	NO
SB	M04	7,02	1.08	*	F	M04A	4,07	0.59	20.4	C	M04B	3,840	0.59	21.2	C	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	6,45	0.98	42.6	E	M05A	4,29	0.63	21.5	C	M05B	3,970	0.63	21.5	C	NO	NO
SB	M06	7,20	1.12	*	F	M06A	4,74	0.69	24.1	C	M06B	4,480	0.72	25.1	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	6,78	1.04	*	F	M07A	4,65	0.68	23.6	C	M07B	4,330	0.69	24.0	C	NO	NO
SB	M08	7,29	1.13	*	F	M08A	5,19	0.76	26.9	D	M08B	4,860	0.78	27.8	D	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	7,43	1.14	*	F	M09A	4,82	0.70	24.5	C	M09B	4,510	0.72	25.3	C	NO	NO
NB Inner	M10A	4,67	0.68	23.7	C	M10A	4,82	0.70	24.5	C	-	-	-	-	-	NO	-
NB Outer	M10B	2,76	0.68	23.7	C	-	-	-	-	-	M10B	4,510	0.72	25.3	C	-	NO
SB	M11	8,17	1.26		F	M11A	5,73	0.84	31.1	D	M11B	5,330	0.85	32.0	D	NO	NO
SB Inner	M12A	4,70	0.69	23.8	C	M12A	5,73	0.84	31.1	D	-	-	-	-	-	YES	-
SB Outer	M12B	3,47	0.85	32.0	D	-	-	-	-	-	M12B	5,330	0.85	32.0	D	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	6,43	0.94	38.6	E	M13A	5,85	0.86	32.2	D	-	-	-	-	-	NO	-
NB Outer	M13B	3,72	0.94	38.2	E	-	-	-	-	-	M13B	5,420	0.88	33.5	D	-	NO
SB Inner	M14A	6,71	0.98	42.8	E	M14A	6,13	0.90	35.0	E	-	-	-	-	-	NO	-
SB Outer	M14B	3,86	0.98	42.8	E	-	-	-	-	-	M14B	5,610	0.90	35.0	E	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.70
2032 Level of Service Summary (With N.J. Route 92) – Sunday PM Peak Hour
Mainline Segment Analysis
Comparison of No-Build With Build (Inner and Outer Roadways) Conditions

Direction	2032 (With N.J. Route 92) Sunday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner/Single Roadway)					Build (Outer Roadway)						
	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Segment	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 5 to Interchange 6																	
NB	M01	6,68	1.00	45.0	E	M01	6,13	0.92	37.0	E	-	-	-	-	-	NO	-
NB	M01	6,68	1.00	45.0	E	M01A	3,15	0.46	15.8	B	M01B	2,980	0.46	15.8	B	NO	NO
SB	M02	6,53	1.01	*	F	M02	6,27	0.97	41.1	E	-	-	-	-	-	NO	-
SB	M02	6,53	1.01	*	F	M02A	3,18	0.46	15.9	B	M02B	3,100	0.47	16.1	B	NO	NO
Interchange 6 to Interchange 7																	
NB	M03	7,93	1.18	*	F	M03A	3,84	0.56	19.3	C	M03B	3,700	0.57	19.4	C	NO	NO
SB	M04	8,94	1.33	*	F	M04A	4,49	0.66	22.6	C	M04B	4,370	0.66	22.7	C	NO	NO
Interchange 7 to Interchange 7A																	
NB	M05	8,23	1.23	*	F	M05A	4,07	0.59	20.4	C	M05B	3,910	0.60	20.6	C	NO	NO
SB	M06	9,09	1.35	*	F	M06A	4,55	0.66	23.0	C	M06B	4,450	0.67	23.1	C	NO	NO
Interchange 7A to Interchange 8																	
NB	M07	8,63	1.29	*	F	M07A	4,18	0.61	21.0	C	M07B	4,060	0.62	21.5	C	NO	NO
SB	M08	8,57	1.27	*	F	M08A	4,38	0.64	22.1	C	M08B	4,280	0.65	22.2	C	NO	NO
Interchange 8 to Interchange 8A																	
NB	M09	8,56	1.28	*	F	M09A	4,32	0.63	21.7	C	M09B	4,190	0.64	22.2	C	NO	NO
NB Inner	M10A	5,24	0.77	27.3	D	M10A	4,32	0.63	21.7	C	-	-	-	-	-	NO	-
NB Outer	M10B	3,32	0.77	27.3	D	-	-	-	-	-	M10B	4,190	0.64	22.2	C	-	NO
SB	M11	8,55	1.27		F	M11A	4,26	0.62	21.4	C	M11B	4,160	0.63	21.6	C	NO	NO
SB Inner	M12A	4,97	0.73	25.5	C	M12A	4,26	0.62	21.4	C	-	-	-	-	-	NO	-
SB Outer	M12B	3,58	0.82	30.0	D	-	-	-	-	-	M12B	4,160	0.63	21.6	C	-	NO
Interchange 8A to Interchange 9																	
NB Inner	M13A	5,81	0.85	31.8	D	M13A	4,84	0.71	24.7	C	-	-	-	-	-	NO	-
NB Outer	M13B	3,68	0.85	31.8	D	-	-	-	-	-	M13B	4,710	0.72	25.3	C	-	NO
SB Inner	M14A	5,57	0.81	29.7	D	M14A	4,71	0.69	23.9	C	-	-	-	-	-	NO	-
SB Outer	M14B	3,56	0.81	29.8	D	-	-	-	-	-	M14B	4,580	0.69	23.9	C	-	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
*NB = Northbound; SB = Southbound; * = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

- Between Interchange 7A and Interchange 8
  Mainline segment M07 (northbound) is projected to operate at LOS "E" during the Weekday PM peak hour and at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Mainline segment M08 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

- Between Interchange 8 and Interchange 8A
  Mainline segment M09 (northbound) is projected to operate at LOS "E" during the Weekday PM peak hour and at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  Mainline segment M12 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and at LOS "F" during the Weekday PM, Friday PM and Sunday PM peak hours.

- Between Interchange 8A and Interchange 9
  Mainline segment M15 (northbound inner) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during the Weekday AM peak hour.

  Mainline segment M16 (northbound outer) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during the Weekday AM peak hour.

  Mainline segment M17 (southbound inner) is projected to operate at LOS "E" during the Friday PM peak hour.

  Mainline segment M18 (southbound outer) is projected to operate at LOS "E" during the Friday PM peak hour.

Ramp Junctions (Merge and Diverge) Analysis

A total of 23 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis with construction of N.J. Route 92 is presented in Tables 4.71 through 4.74. During the analyzed peak hours, all ramps are projected to operate at LOS D or better except for the following:

- Interchange 6
  On-Ramp R02 (northbound) is projected to operate at LOS "F" during the Sunday PM peak hour.

  Off-Ramp R03 (southbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  On-Ramp R04 (southbound) is projected to operate at LOS "E" during the Sunday PM peak hour.

- Interchange 7
  Off-Ramp R05 (northbound) is projected to operate at LOS "F" during the Sunday PM peak hour.

  On-Ramp R06 (northbound) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during both the Weekday AM and Sunday PM peak hours.

Table 4.71
2032 Level of Service Summary (With N.J. Route 92) – Weekday AM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 (With N.J. Route 92) Weekday AM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Ramp)					Build (Outer Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	770	0.70	21.2	C	R01A	430	0.51	14.1	B	R01B	360	0.51	14.0	B	NO	NO
NB On	R02	1,550	0.98	28.0	C	R02A	1,160	0.60	3.1	A	R02B	1,030	0.60	3.3	A	NO	NO
SB Off	R03	2,330	1.06	32.0	F	R03A	1,460	0.58	5.6	A	R03B	1,340	0.62	7.1	A	NO	NO
SB On	R04	210	0.64	24.5	C	R04A	110	0.33	10.1	B	R04B	110	0.37	11.5	B	NO	NO
Interchange 7																	
NB Off	R05	360	0.91	27.4	C	R05A	240	0.61	15.7	B	R05B	220	0.61	15.9	B	NO	NO
NB On	R06	1,180	1.11	41.5	F	R06A	900	0.71	20.8	C	R06B	740	0.71	20.3	C	NO	NO
SB Off	R07	640	0.92	29.2	D	R07A	360	0.55	14.7	B	R07B	370	0.61	16.8	B	NO	NO
SB On	R08	1,080	1.03	37.9	E	R08A	650	0.57	16.1	B	R08B	580	0.62	17.7	B	NO	NO
Interchange 7A																	
NB Off	R09	440	1.00	31.6	F	R09A	410	0.70	20.0	B	R09B	350	0.70	20.1	C	NO	NO
NB On	R10	1,370	1.27	47.0	F	R10A	1,470	0.85	4.0	A	R10B	1,340	0.85	3.0	A	NO	NO
SB Off	R11	1,200	1.02	32.4	F	R11A	910	0.54	2.1	A	R11B	830	0.58	3.8	A	NO	NO
SB On	R12	490	0.93	32.5	D	R12A	370	0.50	15.2	B	R12B	350	0.55	17.0	B	NO	NO
Interchange 8																	
NB Off	R13	600	1.09	35.1	F	R13A	410	0.82	25.0	C	R13B	320	0.83	25.1	C	NO	NO
NB On	R14	1,590	1.42	52.5	F	R14A	1,240	1.00	31.3	D	R14B	1,150	1.02	31.2	D	NO	NO
SB Off	R15	450	0.94	29.4	D	R15A	350	0.60	16.4	B	R15B	470	0.69	19.9	B	NO	NO
SB On	R16	1,040	1.06	39.9	F	R16A	560	0.59	18.4	B	R16B	550	0.65	20.4	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	440	0.84	27.0	C	R17A	1,020	0.93	30.7	D	-	-	-	-	-	YES	-
NB Off-Out	R17B	240	0.90	28.7	D	-	-	-	-	-	R17B	820	0.94	30.3	D	-	YES
NB On-In	R18A	1,910	1.14	42.1	F	R18A	1,330	1.06	33.1	D	-	-	-	-	-	NO	-
NB On-Out	R18B	1,090	1.08	41.0	F	-	-	-	-	-	R18B	1,200	1.08	33.4	F	-	NO
SB Off-In	R19A	2,750	1.01	34.0	F	R19A	2,020	0.85	27.9	F	-	-	-	-	-	NO	-
SB Off-Out	R19B	1,210	0.94	32.2	D	-	-	-	-	-	R19B	1,320	0.81	27.1	C	-	NO
SB On	R20	900	0.79	30.7	D	R20A	780	0.58	17.9	B	R20B	730	0.67	21.1	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.72
2032 Level of Service Summary (With N.J. Route 92) – Weekday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 (With N.J. Route 92) Weekday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	410	0.55	15.4	B	R01A	210	0.43	11.1	B	R01B	190	0.43	11.1	B	NO	NO
NB On	R02	1,500	0.88	24.7	C	R02A	950	0.52	0.4	A	R02B	880	0.52	0.4	A	NO	NO
SB Off	R03	1,390	0.80	22.1	C	R03A	840	0.43	(0.1)	A	R03B	790	0.46	1.1	A	NO	NO
SB On	R04	290	0.63	24.1	C	R04A	140	0.33	10.2	B	R04B	140	0.36	11.2	B	NO	NO
Interchange 7																	
NB Off	R05	250	0.84	24.6	C	R05A	170	0.54	13.2	B	R05B	150	0.54	13.2	B	NO	NO
NB On	R06	420	0.84	32.2	D	R06A	320	0.52	14.3	B	R06B	260	0.52	13.6	B	NO	NO
SB Off	R07	740	0.89	28.0	C	R07A	510	0.55	14.6	B	R07B	540	0.60	16.7	B	NO	NO
SB On	R08	390	0.80	29.9	D	R08A	220	0.44	11.7	B	R08B	200	0.48	12.9	B	NO	NO
Interchange 7A																	
NB Off	R09	590	0.87	26.7	C	R09A	410	0.57	15.2	B	R09B	320	0.57	15.1	B	NO	NO
NB On	R10	1,250	1.03	38.4	E	R10A	1,000	0.62	(4.0)	A	R10B	900	0.62	(5.0)	A	NO	NO
SB Off	R11	1,400	1.01	32.2	F	R11A	1,410	0.66	6.6	A	R11B	1,220	0.67	7.2	A	NO	NO
SB On	R12	490	0.87	30.6	D	R12A	290	0.49	14.6	B	R12B	270	0.53	16.4	B	NO	NO
Interchange 8																	
NB Off	R13	520	0.95	29.7	D	R13A	430	0.65	18.5	B	R13B	310	0.65	18.7	B	NO	NO
NB On	R14	670	0.99	37.5	E	R14A	480	0.62	18.1	B	R14B	440	0.65	18.3	B	NO	NO
SB Off	R15	1,450	1.09	35.2	F	R15A	1,150	0.82	25.0	C	R15B	970	0.84	25.5	C	NO	NO
SB On	R16	500	0.99	37.5	F	R16A	330	0.64	20.3	C	R16B	320	0.68	21.6	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	80	0.64	19.6	B	R17A	390	0.66	20.2	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	90	0.65	19.5	B	-	-	-	-	-	R17B	350	0.68	20.4	C	-	NO
NB On-In	R18A	1,920	0.98	36.5	E	R18A	1,580	0.89	27.0	C	-	-	-	-	-	NO	-
NB On-Out	R18B	1,090	0.89	34.2	D	-	-	-	-	-	R18B	1,400	0.92	27.3	C	-	NO
SB Off-In	R19A	1,740	0.95	31.7	D	R19A	1,010	0.85	27.7	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	1,110	0.97	33.2	D	-	-	-	-	-	R19B	800	0.84	28.3	D	-	NO
SB On	R20	840	0.82	31.9	D	R20A	750	0.80	25.5	C	R20B	690	0.81	25.9	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.73
2032 Level of Service Summary (With N.J. Route 92) – Friday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 Friday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	470	0.64	18.7	B	R01A	240	0.48	12.7	B	R01B	220	0.48	12.8	B	NO	NO
NB On	R02	1,780	1.03	29.9	D	R02A	1,150	0.60	3.1	A	R02B	1,090	0.60	3.1	A	NO	NO
SB Off	R03	1,680	1.03	30.9	F	R03A	1,110	0.58	5.6	A	R03B	1,060	0.61	6.6	A	NO	NO
SB On	R04	310	0.84	31.6	D	R04A	130	0.44	14.2	B	R04B	130	0.45	14.7	B	NO	NO
Interchange 7																	
NB Off	R05	470	0.95	28.6	D	R05A	240	0.61	15.7	B	R05B	220	0.61	15.7	B	NO	NO
NB On	R06	490	0.96	36.3	E	R06A	750	0.67	19.7	B	R06B	690	0.68	19.0	B	NO	NO
SB Off	R07	580	1.04	33.5	F	R07A	900	0.76	22.5	C	R07B	840	0.78	23.3	C	NO	NO
SB On	R08	400	1.05	38.8	F	R08A	230	0.60	17.2	B	R08B	200	0.62	18.0	B	NO	NO
Interchange 7A																	
NB Off	R09	950	0.97	30.2	D	R09A	580	0.69	19.7	B	R09B	490	0.68	19.5	B	NO	NO
NB On	R10	1,270	1.09	40.5	F	R10A	950	0.69	(1.4)	A	R10B	850	0.70	(2.4)	A	NO	NO
SB Off	R11	730	1.05	33.4	F	R11A	850	0.67	7.1	A	R11B	750	0.68	7.4	A	NO	NO
SB On	R12	640	1.12	39.2	F	R12A	400	0.70	22.3	C	R12B	370	0.72	23.0	C	NO	NO
Interchange 8																	
NB Off	R13	450	0.98	31.1	F	R13A	320	0.72	21.2	C	R13B	260	0.73	21.4	C	NO	NO
NB On	R14	1,100	1.16	43.5	F	R14A	480	0.73	21.7	C	R14B	440	0.75	21.7	C	NO	NO
SB Off	R15	1,680	1.15	37.4	F	R15A	980	0.87	26.8	C	R15B	880	0.88	27.2	C	NO	NO
SB On	R16	810	1.12	42.1	F	R16A	430	0.77	24.6	C	R16B	410	0.77	24.8	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	290	0.72	22.7	C	R17A	470	0.75	23.6	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	180	0.75	23.0	C	-	-	-	-	-	R17B	420	0.76	23.6	C	-	NO
NB On-In	R18A	2,040	1.06	39.2	E	R18A	1,500	0.96	29.6	D	-	-	-	-	-	NO	-
NB On-Out	R18B	1,140	0.98	37.2	E	-	-	-	-	-	R18B	1,340	0.98	29.7	D	-	NO
SB Off-In	R19A	2,010	1.03	34.6	F	R19A	1,130	0.92	30.6	D	-	-	-	-	-	NO	-
SB Off-Out	R19B	1,260	1.07	37.1	F	-	-	-	-	-	R19B	970	0.92	31.3	D	-	NO
SB On	R20	870	0.89	34.3	D	R20A	730	0.87	28.2	D	R20B	700	0.86	27.9	C	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Table 4.74
2032 Level of Service Summary (With N.J. Route 92) – Sunday PM Peak Hour
Ramp Junction Analysis
Comparison of No-Build With Build (Inner and Outer Roadway Ramps) Conditions

Ramp	2032 Sunday PM Peak Hour															Significant Impact From No Build?	
	No Build					Build (Inner Roadway Ramp)					Build (Outer Roadway Ramp)						
	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Location	(1) Vol.	(2) V/C	(3) Dens.	(4) LOS	Build Inner Rdwy	Build Outer Rdwy
Interchange 6																	
NB Off	R01	910	0.86	27.1	C	R01A	430	0.53	14.7	B	R01B	390	0.53	14.6	B	NO	NO
NB On	R02	2,150	1.25	37.4	F	R02A	1,120	0.60	3.3	A	R02B	1,110	0.61	3.5	A	NO	NO
SB Off	R03	2,730	1.34	42.6	F	R03A	1,470	0.68	9.1	A	R03B	1,400	0.67	9.0	A	NO	NO
SB On	R04	320	0.94	35.2	E	R04A	160	0.46	14.8	B	R04B	130	0.46	15.0	B	NO	NO
Interchange 7																	
NB Off	R05	640	1.07	33.4	F	R05A	380	0.62	16.3	B	R05B	360	0.62	16.5	B	NO	NO
NB On	R06	950	1.23	45.8	F	R06A	600	0.63	18.2	B	R06B	570	0.64	17.7	B	NO	NO
SB Off	R07	680	1.15	37.9	F	R07A	400	0.71	20.7	C	R07B	410	0.72	20.9	C	NO	NO
SB On	R08	530	1.29	47.3	F	R08A	340	0.67	19.6	B	R08B	330	0.67	19.7	B	NO	NO
Interchange 7A																	
NB Off	R09	1,290	1.12	36.0	F	R09A	570	0.66	18.6	B	R09B	510	0.66	18.7	B	NO	NO
NB On	R10	1,680	1.35	49.7	F	R10A	690	0.60	(4.4)	A	R10B	660	0.61	(5.2)	A	NO	NO
SB Off	R11	880	1.13	36.4	F	R11A	390	0.52	1.6	A	R11B	380	0.53	1.7	A	NO	NO
SB On	R12	1,400	1.41	49.3	F	R12A	560	0.69	21.7	C	R12B	550	0.69	21.9	C	NO	NO
Interchange 8																	
NB Off	R13	580	1.12	36.4	F	R13A	220	0.66	18.8	B	R13B	210	0.67	19.3	B	NO	NO
NB On	R14	510	1.23	46.3	F	R14A	350	0.64	18.8	B	R14B	340	0.66	18.6	B	NO	NO
SB Off	R15	530	1.12	36.0	F	R15A	220	0.67	19.1	B	R15B	220	0.67	19.3	B	NO	NO
SB On	R16	540	1.23	46.2	F	R16A	350	0.65	20.3	C	R16B	340	0.65	20.5	C	NO	NO
Interchange 8A																	
NB Off-In	R17A	160	0.79	25.1	C	R17A	170	0.67	20.8	C	-	-	-	-	-	NO	-
NB Off-Out	R17B	100	0.84	26.4	C	-	-	-	-	-	R17B	160	0.68	20.7	C	-	NO
NB On-In	R18A	730	0.86	32.5	D	R18A	700	0.75	22.4	C	-	-	-	-	-	NO	-
NB On-Out	R18B	470	0.89	34.4	D	-	-	-	-	-	R18B	680	0.77	22.3	C	-	NO
SB Off-In	R19A	600	0.84	27.4	C	R19A	670	0.74	23.8	C	-	-	-	-	-	NO	-
SB Off-Out	R19B	370	0.89	30.2	D	-	-	-	-	-	R19B	630	0.74	24.7	C	-	NO
SB On	R20	390	0.85	33.3	D	R20A	210	0.62	19.4	B	R20B	210	0.62	19.6	B	NO	NO

Notes:
(1) Vol. = Volume; (2) V/C = Vehicle to Capacity Ratio; (3) Dens. = Density: Passenger Car Per Mile Per Lane (pcpmpl); (4) LOS = Level of Service;
NB = Northbound; SB = Southbound; On = On-Ramp; Off = Off-Ramp; In = Inner Roadway; Out = Outer Roadway;
** = Density Exceeds HCM analysis value of 45 pcpmpl.*

Source: The Louis Berger Group, Inc. 2006.

Off-Ramp R07 (southbound) is projected to operate at LOS "F" during both the Friday PM and Sunday PM peak hours.

Off-Ramp R08 (southbound) is projected to operate at LOS "E" during the Weekday AM peak hour and at LOS "F" during both the Friday PM and Sunday PM peak hours.

- Interchange 7A
  Off-Ramp R09 (southbound) is projected to operate at LOS "F" during both the Weekday AM and Sunday PM peak hours.

  On-Ramp R10 (northbound) is projected to operate at LOS "E" during the Weekday PM and at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Off-ramp R11 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

  Off-ramp R12 (southbound) is projected to operate at LOS "F" during both the Friday PM and Sunday PM peak hours.

- Interchange 8
  Off-ramp R13 (northbound) is projected to operate at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  On-ramp R14 (northbound) is projected to operate at LOS "E" during the Weekday PM peak hour and at LOS "F" during the Weekday AM, Friday PM and Sunday PM peak hours.

  Off-ramp R15 (southbound) is projected to operate at LOS "F" during the Weekday PM, Friday PM and Sunday PM peak hours.

  On-ramp R16 (southbound) is projected to operate at LOS "F" during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours.

- Interchange 8A
  Off-ramp R19 (northbound inner) is projected to operate at LOS "E" during both the Weekday PM and Friday PM peak hours and at LOS "F" during the Weekday AM peak hour.

  On-ramp R20 (northbound outer) is projected to operate at LOS "E" during the Friday PM peak hour and at LOS "F" during the Weekday AM peak hour.

  Off-ramp R21 (southbound inner) is projected to operate at LOS "F" during both the Weekday AM and Friday PM peak hours.

  Off-ramp R22 (southbound outer) is projected to operate at LOS "F" during the Friday PM peak hour.

Year 2032 Build (With N.J. Route 92)

Turnpike Mainline Segment Analysis

A total of 30 Turnpike mainline segments (between Interchange 5 and Interchange 9) were analyzed for Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM freeway methodology previously described. A summary of the Turnpike mainline segment LOS

analysis with construction of N.J. Route 92 is presented in Tables 4.67 through 4.70. During the analyzed peak hours, all mainline segments are projected to operate at LOS D or better except for the following:

- Between Interchange 5 and Interchange 6
  Mainline segment M01A (northbound inner) is projected to operate at LOS "E" during the Sunday PM peak hour.

  Mainline segment M02A (southbound inner) is projected to operate at LOS "E" during both the Friday PM and Sunday PM peak hours.

- Between Interchange 8 and Interchange 8A
  Mainline segment M09A (northbound inner) is projected to operate at LOS "E" during the Weekday AM peak hour.

  Mainline segment M09B (northbound outer) is projected to operate at LOS "E" during the Weekday AM peak hour.

  Mainline segment M10 (northbound inner) is projected to operate at LOS "E" during the Weekday AM peak hour.

  Mainline segment M11 (northbound outer) is projected to operate at LOS "E" during the Weekday AM peak hour.

- Between Interchange 8A and Interchange 9
  Mainline segment M15 (northbound inner) is projected to operate at LOS "E" during the Weekday AM peak hour.

  Mainline segment M17 (southbound inner) is projected to operate at LOS "E" during the Friday PM peak hour.

  Mainline segment M17 (southbound outer) is projected to operate at LOS "E" during the Friday PM peak hour.

Ramp Junctions (Merge and Diverge) Analysis

A total of 40 Turnpike ramp junctions (merge and diverge influence areas at five Turnpike Interchanges) Weekday AM, Weekday PM, Friday PM and Sunday PM peak hour conditions using the HCM ramp junction methodology previously described. A summary of the Turnpike ramp junction LOS analysis with construction of N.J. Route 92 is presented in Tables 4.71 through 4.74. During the analyzed peak hours, all ramps are projected to operate at LOS D or better.

4.17.3.3 Future Impact Analysis

The determination of potentially significant traffic impacts are based upon the comparison of traffic conditions in the Future No-Build and Build Conditions. The definition of significant traffic impacts used in the traffic analyses is contained in the *New Jersey State Highway Access Management Code* (N.J.A.C. 16:47). This code applies to all state highways in New Jersey. The code limits access to state highways by promoting the use of shared driveways, the access to secondary streets that intersect with state highways, and the application of interconnected parking lots. Also contained within the *State Highway Access Management Code*, *Subchapter 4 – Permits*, are guidelines pertaining to uninterrupted-flow standards (N.J.A.C. 16:47-4.25) and ramp standards (N.J.A.C. 16:47-4.29).

Generally, the code is used in determining fair-share financial contributions based on the level of impact a development project has on the local and regional traffic network. In the case of the Proposed Project, these standards will be used to quantify the level of impact the project will have on the Turnpike mainline between Interchange 6 and Interchange 8A. Based on the traffic volumes and operational characteristics of the Turnpike (between these two points), the criteria for an urban lot were chosen for the mainline and ramp junction significant impact analyses. Since the roadway configuration of the No-Build Condition is primarily a single roadway and the roadway configuration of the Build Condition is a dual roadway, separate comparisons were made between the No-Build Condition mainline and the Build Condition mainline inner roadway and outer roadway segments. A similar comparison was made with ramp junctions, which are primarily single ramps in the No-Build Condition and dual ramps in the Build Condition.

The sections of the code that pertain to general level of service standards and ramp standards for an urban lot are listed below:

16:47-4.24 General level of service standards

(a) General LOS standards applicable to traffic from a lot are based on whether the lot is located in an urban or rural area and the LOS of the highway segments at the time the access opens. These LOS standards, and those in N.J.A.C. 16:47-4.25 through 4.29, apply to applications classified as majors with planning review.

1. Study locations, applicable to an urban lot, for highway segments anticipated to operate under the no-build condition at:

i. LOS A, B, C, D, or E, some deterioration will be allowed, provided that the LOS does not drop below LOS E;

ii. LOS F, no deterioration will be allowed.

2. Study locations, applicable to a rural lot, for highway segments anticipated to operate under the no-build condition at:

i. LOS A, B, C, or D, some deterioration will be allowed, provided that the LOS does not drop below D;

ii. LOS E or F, no deterioration will be allowed.

16:47-4.29 Ramp standards

(a) Ramp standards are based on density, the primary measure of effectiveness, and the level of service criteria shown in Table 5-2 of the "1994 Highway Capacity Manual" Special Report 209, or superseding issue.

(b) For a study location, applicable to an urban lot on State highway segments, with:

1. *A merge or diverge influence area which operates at LOS A-C under the no-build condition, the maximum allowable deterioration shall be 25 percent of the difference between no-build density and 35 pc/mi/ln.*

2. *A merge or diverge influence area which operates at LOS D-E under the no-build condition, the maximum allowable degradation shall correspond to either 25 percent of the difference between the no-build density and 35 pc/mi/ln or 25 percent of the difference between the no-build flow*

rates in the influence area and the capacity values in Table 5-1, where the no-build densities exceed 35 pc/mi/ln.

3. *A merge or diverge influence area which operates under the no-build conditions at LOS F, no deterioration will be allowed.*

The results of future impact analysis for the Turnpike mainline segments and ramp junctions are summarized in Tables 4.43 through 4.74.

Mainline Segments

During the 2012 and 2032 Build Conditions, no significant impacts are projected on Turnpike mainline segments as a result of the Proposed Project during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours, except for the following:

- 2032 (Without N.J. Route 92) Weekday AM
  The V/C ratio for mainline segment M10B (northbound outer) is projected to increase from 0.82 (LOS D) in the No-Build Condition to 0.94 (LOS E) in the Build Condition.

  The V/C ratio for mainline segment M12A (southbound inner) is projected to increase from 0.54 (LOS C) in the No-Build Condition to 0.67 (LOS C) in the Build Condition

- 2032 (Without N.J. Route 92) Weekday PM
  The V/C ratio for mainline segment M12A (southbound inner) is projected to increase from 0.64 (LOS C) in the No-Build Condition to 0.76 (LOS D) in the Build Condition.

- 2032 (Without N.J. Route 92) Friday PM
  The V/C ratio for mainline segment M01 (northbound inner) is projected to increase from 0.76 (LOS D) in the No-Build Condition to 0.88 (LOS D) in the Build Condition.

  The V/C ratio for mainline segment M12A (southbound inner) is projected to increase from 0.69 (LOS C) in the No-Build Condition to 0.85 (LOS D) in the Build Condition.

- 2032 (With N.J. Route 92) Weekday AM
  The V/C ratio for mainline segment M10B (northbound outer) is projected to increase from 0.82 (LOS D) in the No-Build Condition to 0.94 (LOS E) in the Build Condition.

- 2032 (With N.J. Route 92) Weekday PM
  The V/C ratio for mainline segment M12A (southbound inner) is projected to increase from 0.63 (LOS C) in the No-Build Condition to 0.76 (LOS D) in the Build Condition.

- 2032 (With N.J. Route 92) Friday PM
  The V/C ratio for mainline segment M12A (southbound inner) is projected to increase from 0.69 (LOS C) in the No-Build Condition to 0.84 (LOS D) in the Build Condition.

Ramp Junctions

During the 2012 and 2032 Build Conditions, no significant impacts are projected on Turnpike ramp junctions as a result of the Turnpike Widening during the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours, except for the following:

- 2032 (Without N.J. Route 92) Weekday AM
  The density for ramp junction R17A (northbound off-inner) is projected to increase from 26.9 (LOS C) in the No-Build Condition to 30.5 (LOS D) in the Build Condition.

- 2032 (With N.J. Route 92) Weekday AM
  The density for ramp junction R17A (northbound off-inner) is projected to increase from 27.0 (LOS C) in the No-Build Condition to 30.7 (LOS D) in the Build Condition.

  The density for ramp junction R17B (northbound off-outer) is projected to increase from 28.7 (LOS D) in the No-Build Condition to 30.3 (LOS D) in the Build Condition.

4.17.3.4 Future Safety Analysis

2012 and 2032 No-Build Accident Projections

Average Annual Daily Traffic (AADT) volumes along the Turnpike Mainline (between interchanges) for the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours were projected for 2012 and 2032 No-Build Conditions (without N.J. Route 92) using the travel model. The number of accidents on each segment of the Turnpike Mainline were projected based on the calculated existing actual accident rate and the projected 2012 and 2032 No-Build Conditions AADT volumes. These results are presented in Tables 4.75 and 4.76, respectively. Given that the Existing Condition accident data were measured over a two-year period (2002-2003), the annual average number of accidents over these two years was used in the comparison with the 2012 and 2032 No-Build Condition accident data.

Based on the results, the total number of accidents on the Turnpike mainline (from M.P. 48.0 to M.P. 78.0) in the 2012 No-Build Condition is projected to increase by 184 accidents (from 1,249 to 1,433) from the Existing Condition. For the 2032 No-Build Condition, the number of accidents is projected to increase by 759 (from 1,249 to 2,008) from the Existing Condition. Since the accident rate for the existing condition is low and well below the statewide accident rate, the overall increase in accidents for 2012 and 2032 is minimal and consistent with the projected growth in traffic.

2012 and 2032 Build Accident Projections

Average Annual Daily Traffic (AADT) volumes along the Turnpike Mainline (between interchanges) for the Weekday AM, Weekday PM, Friday PM and Sunday PM peak hours were projected for 2012 and 2032 Build Conditions (without N.J. Route 92) using the travel model. The number of accidents on each segment of the Turnpike Mainline were projected based on the calculated existing accident rates and the 2012 and 2032 Build Conditions AADT volumes. These results are presented in Tables 4.77 and 4.78, respectively.

Based on the results, the total number of accidents on the Turnpike mainline (from milepost 48 to 78) in the 2012 Build Condition is projected to increase by 154 accidents (from 1,433 to 1,587) from the 2012 No-Build Condition. For the 2032 Build Condition, the number of accidents is projected to increase by 438 (from 2,008 to 2,446). However, these increases in the total number of accidents are not significant as the proposed widening of the Turnpike from six lanes (three lanes in each direction) to twelve lanes (six lanes in each direction) will bring about improvements in roadway geometry and configuration (i.e. only passenger cars allowed in the inner roadway); and a reduction in congestion (i.e., LOS is projected to improve). These improvements to the Turnpike will lead to direct improvements in safety, and ultimately reduce the total number of accidents in the 2012 and 2032 Build Conditions.

Table 4.75
Projected Accidents – 2012 No-Build Condition
New Jersey Turnpike Mainline (Milepost 48 to 78)

Milepost			Section Length (Miles)	Average Annual Daily Traffic (AADT)	Accident Rate (MVM)	2012 Vehicular Accidents
No.	Start (Mile)	End (Mile)				
48	48.0	49.0	1.0	101,909	0.7339	27
49	49.0	50.0	1.0	101,909	0.5973	22
50	50.0	51.0	1.0	101,909	0.5973	22
Interchange 6 (Milepost 51.0)						
51	51.0	52.0	1.0	132,203	0.7953	38
52	52.0	53.0	1.0	132,203	0.7332	35
Interchange 7 (Milepost 53.3)						
53	53.0	54.0	1.0	137,106	1.2488	62
54	54.0	55.0	1.0	137,106	0.6017	30
55	55.0	56.0	1.0	137,106	0.5790	29
56	56.0	57.0	1.0	137,106	0.6812	34
57	57.0	58.0	1.0	137,106	0.8174	41
58	58.0	59.0	1.0	137,106	0.7947	40
59	59.0	60.0	1.0	137,106	0.7834	39
Interchange 7A (Milepost 60.0)						
60	60.0	61.0	1.0	153,395	1.2639	71
61	61.0	62.0	1.0	153,395	0.7604	43
62	62.0	63.0	1.0	153,395	0.6371	36
63	63.0	64.0	1.0	153,395	0.7912	44
64	64.0	65.0	1.0	153,395	0.7810	44
65	65.0	66.0	1.0	153,395	0.7399	41
66	66.0	67.0	1.0	153,395	0.8837	49
67	67.0	68.0	1.0	153,395	1.1715	66
Interchange 8 (Milepost 67.6)						
68	68.0	69.0	1.0	156,795	1.0614	61
69	69.0	70.0	1.0	156,795	0.7837	45
70	70.0	71.0	1.0	156,795	0.8928	51
71	71.0	72.0	1.0	156,795	0.8829	51
72	72.0	73.0	1.0	156,795	1.3491	77
Interchange 8A (Milepost 73.3)						
73	73.0	74.0	1.0	183,869	1.4525	97
74	74.0	75.0	1.0	183,869	1.1907	80
75	75.0	76.0	1.0	183,869	0.6080	41
76	76.0	77.0	1.0	183,869	0.6080	41
77	77.0	78.0	1.0	183,869	0.6671	45
78	78.0	79.0	1.0	183,869	0.4645	31
TOTAL			**31.0**	**-**	**-**	**1,433**

*MVM = Million Vehicle Miles; * Average New Jersey statewide accident rate (2002-2003) on numbered roadways/interstates with 4 or more lanes, barrier median and shoulder.*

Source: The New Jersey Turnpike Authority.

Table 4.76
Projected Accidents – 2032 No-Build Condition
New Jersey Turnpike Mainline (Milepost 48 to 78)

Milepost			Section Length (Miles)	Average Annual Daily Traffic (AADT)	Accident Rate (MVM)	2012 Vehicular Accidents
No.	Start (Mile)	End (Mile)				
48	48.0	49.0	1.0	147,006	0.7339	39
49	49.0	50.0	1.0	147,006	0.5973	32
50	50.0	51.0	1.0	147,006	0.5973	32
Interchange 6 (Milepost 51.0)						
51	51.0	52.0	1.0	191,742	0.7953	56
52	52.0	53.0	1.0	191,742	0.7332	51
Interchange 7 (Milepost 53.3)						
53	53.0	54.0	1.0	198,770	1.2488	91
54	54.0	55.0	1.0	198,770	0.6017	44
55	55.0	56.0	1.0	198,770	0.5790	42
56	56.0	57.0	1.0	198,770	0.6812	49
57	57.0	58.0	1.0	198,770	0.8174	59
58	58.0	59.0	1.0	198,770	0.7947	58
59	59.0	60.0	1.0	198,770	0.7834	57
Interchange 7A (Milepost 60.0)						
60	60.0	61.0	1.0	213,317	1.2639	98
61	61.0	62.0	1.0	213,317	0.7604	59
62	62.0	63.0	1.0	213,317	0.6371	50
63	63.0	64.0	1.0	213,317	0.7912	62
64	64.0	65.0	1.0	213,317	0.7810	61
65	65.0	66.0	1.0	213,317	0.7399	58
66	66.0	67.0	1.0	213,317	0.8837	69
67	67.0	68.0	1.0	213,317	1.1715	91
Interchange 8 (Milepost 67.6)						
68	68.0	69.0	1.0	219,961	1.0614	85
69	69.0	70.0	1.0	219,961	0.7837	63
70	70.0	71.0	1.0	219,961	0.8928	72
71	71.0	72.0	1.0	219,961	0.8829	71
72	72.0	73.0	1.0	219,961	1.3491	108
Interchange 8A (Milepost 73.3)						
73	73.0	74.0	1.0	247,804	1.4525	131
74	74.0	75.0	1.0	247,804	1.1907	108
75	75.0	76.0	1.0	247,804	0.6080	55
76	76.0	77.0	1.0	247,804	0.6080	55
77	77.0	78.0	1.0	247,804	0.6671	60
78	78.0	79.0	1.0	247,804	0.4645	42
TOTAL			**31.0**	**-**	**-**	**2,008**

*MVM = Million Vehicle Miles; * Average New Jersey statewide accident rate (2002-2003) on numbered roadways/interstates with 4 or more lanes, barrier median and shoulder.*

Source: The New Jersey Turnpike Authority.

Table 4.77
Projected Accidents – 2012 Build Condition
New Jersey Turnpike Mainline (Milepost 48 to 78)

Milepost			Section Length (Miles)	Average Annual Daily Traffic (AADT)	Accident Rate (MVM)	2012 Vehicular Accidents
No.	Start (Mile)	End (Mile)				
48	48.0	49.0	1.0	106,628	0.7339	29
49	49.0	50.0	1.0	106,628	0.5973	23
50	50.0	51.0	1.0	106,628	0.5973	23
Interchange 6 (Milepost 51.0)						
51	51.0	52.0	1.0	140,466	0.7953	41
52	52.0	53.0	1.0	140,466	0.7332	38
Interchange 7 (Milepost 53.3)						
53	53.0	54.0	1.0	144,410	1.2488	66
54	54.0	55.0	1.0	144,410	0.6017	32
55	55.0	56.0	1.0	144,410	0.5790	31
56	56.0	57.0	1.0	144,410	0.6812	36
57	57.0	58.0	1.0	144,410	0.8174	43
58	58.0	59.0	1.0	144,410	0.7947	42
59	59.0	60.0	1.0	144,410	0.7834	41
Interchange 7A (Milepost 60.0)						
60	60.0	61.0	1.0	173,444	1.2639	80
61	61.0	62.0	1.0	173,444	0.7604	48
62	62.0	63.0	1.0	173,444	0.6371	40
63	63.0	64.0	1.0	173,444	0.7912	50
64	64.0	65.0	1.0	173,444	0.7810	49
65	65.0	66.0	1.0	173,444	0.7399	47
66	66.0	67.0	1.0	173,444	0.8837	56
67	67.0	68.0	1.0	173,444	1.1715	74
Interchange 8 (Milepost 67.6)						
68	68.0	69.0	1.0	186,115	1.0614	72
69	69.0	70.0	1.0	186,115	0.7837	53
70	70.0	71.0	1.0	186,115	0.8928	61
71	71.0	72.0	1.0	186,115	0.8829	60
72	72.0	73.0	1.0	186,115	1.3491	92
Interchange 8A (Milepost 73.3)						
73	73.0	74.0	1.0	197,367	1.4525	105
74	74.0	75.0	1.0	197,367	1.1907	86
75	75.0	76.0	1.0	197,367	0.6080	44
76	76.0	77.0	1.0	197,367	0.6080	44
77	77.0	78.0	1.0	197,367	0.6671	48
78	78.0	79.0	1.0	197,367	0.4645	33
TOTAL			**31.0**	**-**	**-**	**1,587**

*MVM = Million Vehicle Miles; * Average New Jersey statewide accident rate (2002-2003) on numbered roadways/interstates with 4 or more lanes, barrier median and shoulder.*

Source: The New Jersey Turnpike Authority.

Table 4.78
Projected Accidents – 2032 Build Condition
New Jersey Turnpike Mainline (Milepost 48 to 78)

Milepost			Section Length (Miles)	Average Annual Daily Traffic (AADT)	Accident Rate (MVM)	2012 Vehicular Accidents
No.	Start (Mile)	End (Mile)				
48	48.0	49.0	1.0	158,553	0.7339	42
49	49.0	50.0	1.0	158,553	0.5973	35
50	50.0	51.0	1.0	158,553	0.5973	35
Interchange 6 (Milepost 51.0)						
51	51.0	52.0	1.0	218,032	0.7953	63
52	52.0	53.0	1.0	218,032	0.7332	58
Interchange 7 (Milepost 53.3)						
53	53.0	54.0	1.0	231,010	1.2488	105
54	54.0	55.0	1.0	231,010	0.6017	51
55	55.0	56.0	1.0	231,010	0.5790	49
56	56.0	57.0	1.0	231,010	0.6812	57
57	57.0	58.0	1.0	231,010	0.8174	69
58	58.0	59.0	1.0	231,010	0.7947	67
59	59.0	60.0	1.0	231,010	0.7834	66
Interchange 7A (Milepost 60.0)						
60	60.0	61.0	1.0	274,656	1.2639	127
61	61.0	62.0	1.0	274,656	0.7604	76
62	62.0	63.0	1.0	274,656	0.6371	64
63	63.0	64.0	1.0	274,656	0.7912	79
64	64.0	65.0	1.0	274,656	0.7810	78
65	65.0	66.0	1.0	274,656	0.7399	74
66	66.0	67.0	1.0	274,656	0.8837	89
67	67.0	68.0	1.0	274,656	1.1715	117
Interchange 8 (Milepost 67.6)						
68	68.0	69.0	1.0	294,145	1.0614	114
69	69.0	70.0	1.0	294,145	0.7837	84
70	70.0	71.0	1.0	294,145	0.8928	96
71	71.0	72.0	1.0	294,145	0.8829	95
72	72.0	73.0	1.0	294,145	1.3491	145
Interchange 8A (Milepost 73.3)						
73	73.0	74.0	1.0	280,954	1.4525	149
74	74.0	75.0	1.0	280,954	1.1907	122
75	75.0	76.0	1.0	280,954	0.6080	62
76	76.0	77.0	1.0	280,954	0.6080	62
77	77.0	78.0	1.0	280,954	0.6671	68
78	78.0	79.0	1.0	280,954	0.4645	48
TOTAL			**31.0**	**-**	**-**	**2,446**

*MVM = Million Vehicle Miles; * Average New Jersey statewide accident rate (2002-2003) on numbered roadways/interstates with 4 or more lanes, barrier median and shoulder.*

Source: The New Jersey Turnpike Authority.

4.17.4 Screenline Analysis: No-Build Versus Build

In order to demonstrate the traffic shifts that would be likely to occur among the north-south roads in Central New Jersey in response to the Proposed Project, a screenline analysis was performed. Three screenlines were defined which figuratively intercepted traffic moving along parallel routes to the Turnpike. The three screenlines between Interchange 6 and 7, Interchanges 7A and 8, and Interchanges 8A and 9 are shown in Figure 4-3. Routes that fall within these three screenlines include U.S. Route 1, U.S. Route 130, U.S. Route 206, C.R. 526, and C.R. 615.

Under the No-Build Condition, traffic on the Turnpike between Interchange 6 and Interchange 9 is projected to increase from the Existing Condition. Due to the limited capacity of the six-lane Turnpike section south of Interchange 8A, and the general growth in the region as a whole, traffic on other north-south roads is also projected to grow, often at higher rates than forecast for the Turnpike. Figures 4-4 through 4-6 show the projected percentage growth in peak hour automobile traffic for each crossing of the Interchange 7A to Interchange 8 screenline from 2005 to 2032 for the No-Build Condition (Weekday AM, Weekday PM, and Friday PM peak hours, respectively). Figures 4-7 through 4-9 show the projected percentage growth in peak hour truck traffic.

Turnpike traffic is projected to increase anywhere from 25 percent to 90 percent for automobile traffic, and up to 35 percent for truck traffic. Traffic on the parallel sections of U.S. Route 130 and C.R. 539 are projected to increase at higher rates – up to 140 percent for automobile traffic and 700 percent for truck traffic on U.S. Route 130; and up to 160 percent for automobile traffic and 2,200 percent for truck traffic on C.R. 539.

Figures 4-10 and 4-11 depict how the north-south roads in the Project Corridor are typically used. These figures display the model-estimated breakdown of automobiles (Figure 4-10) and trucks (Figure 4-11) traveling southbound across the Interchange 7A to Interchange 8 screenline during the Friday PM peak hour. Automobile and truck trips are classified into three types:

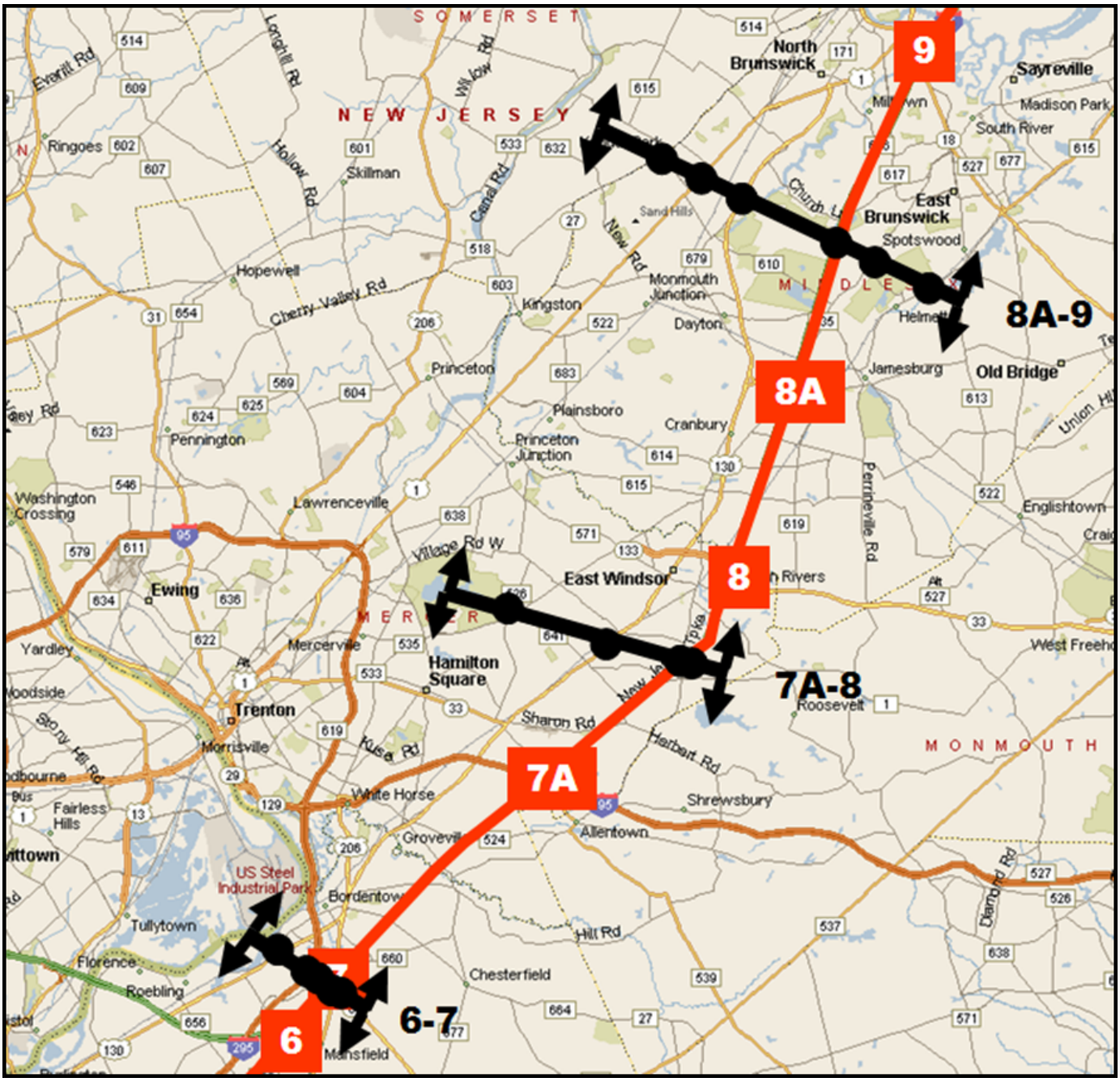
1. Corridor Trips: trips that BOTH begin and end within the Project Corridor
2. Regional Trips: trips that EITHER begin or end within the Project Corridor
3. Through Trips: trips that NEITHER begin or end within the Project Corridor

For the purpose of this analysis, the Project Corridor is defined as:

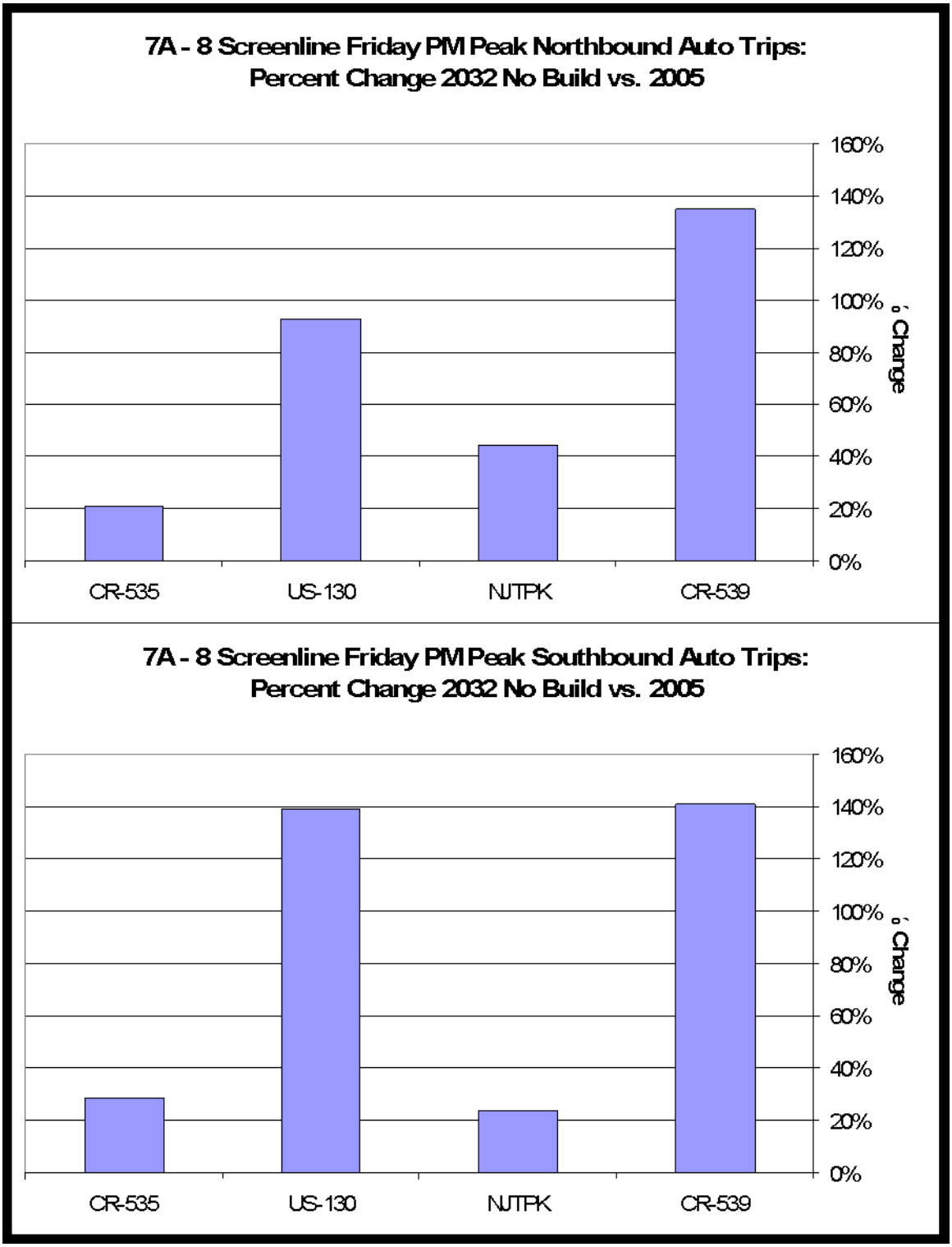
- Middlesex County south of the Raritan River
- All of Mercer County
- Burlington County north of N.J. Route 70
- Monmouth and Ocean Counties north of N.J. Route 70 and west of U.S. Route 9

As shown in Figure 4-10, the model estimates that in 2005, through trips comprise less than 5 percent of southbound Friday PM peak hour auto traffic on U.S. 130 and C.R. 539, but more than 70 percent of southbound Friday PM peak hour auto traffic on the Turnpike. By 2032, it is estimated that through trips will comprise 43 percent and 8 percent of southbound Friday PM peak hour automobile traffic on U.S. 130 and C.R. 539, respectively. Figure 4-11 shows the same data for truck traffic. In this case, the model estimates that by 2032, more than 80 percent of the southbound Friday PM peak hour truck traffic on C.R. 539 will be long-distance traffic, compared with only 12 percent in 2005.

Figure 4-12 shows the shift in southbound Friday PM peak hour traffic from U.S. Route 130 and C.R. 539 to the Turnpike that would result from the Proposed Project. Similarly, Figures 4-13 and 4-14 show the model-projected 2032 No-Build and Build Condition northbound Weekday AM peak period



TURNPIKE SCREENLINE MAP		
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 4-3

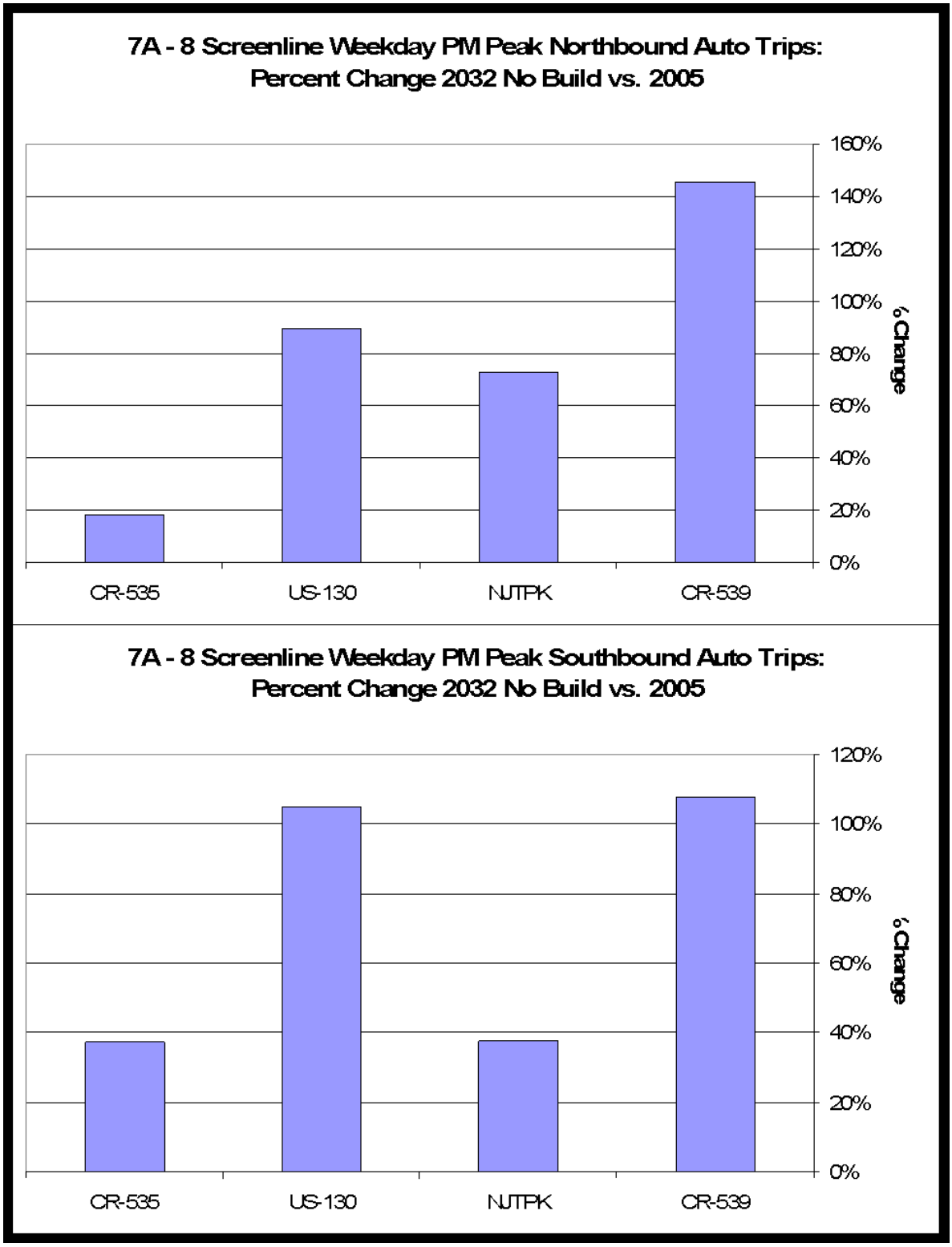


CHANGE IN NO BUILD SCREENLINE 7A-8 VOLUMES (2005-2032)
WEEKDAY AM PEAK HOUR AUTO TRIPS

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
4-4

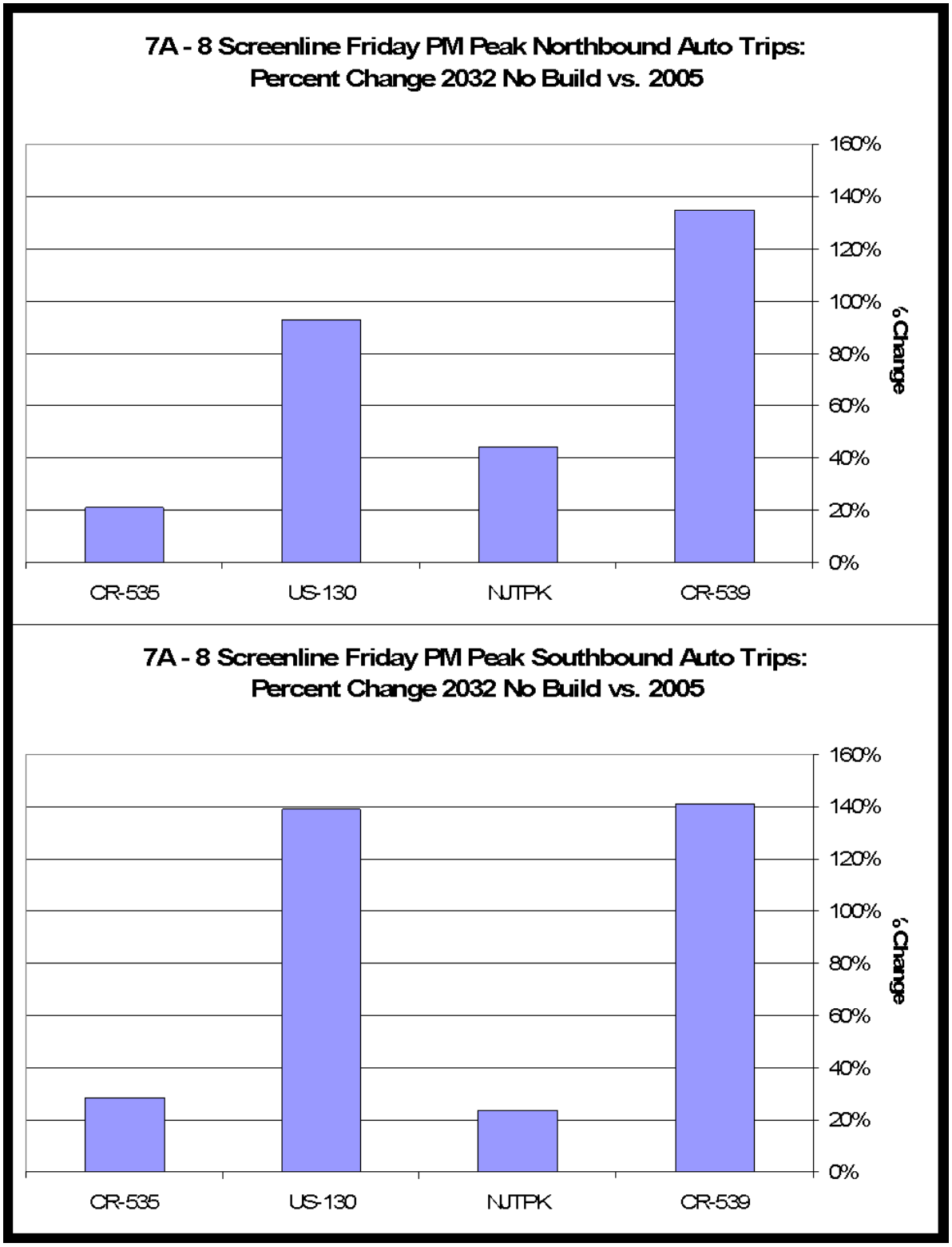


CHANGE IN NO BUILD SCREENLINE 7A-8 VOLUMES (2005-2032)
WEEKDAY PM PEAK HOUR AUTO TRIPS

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
4-5

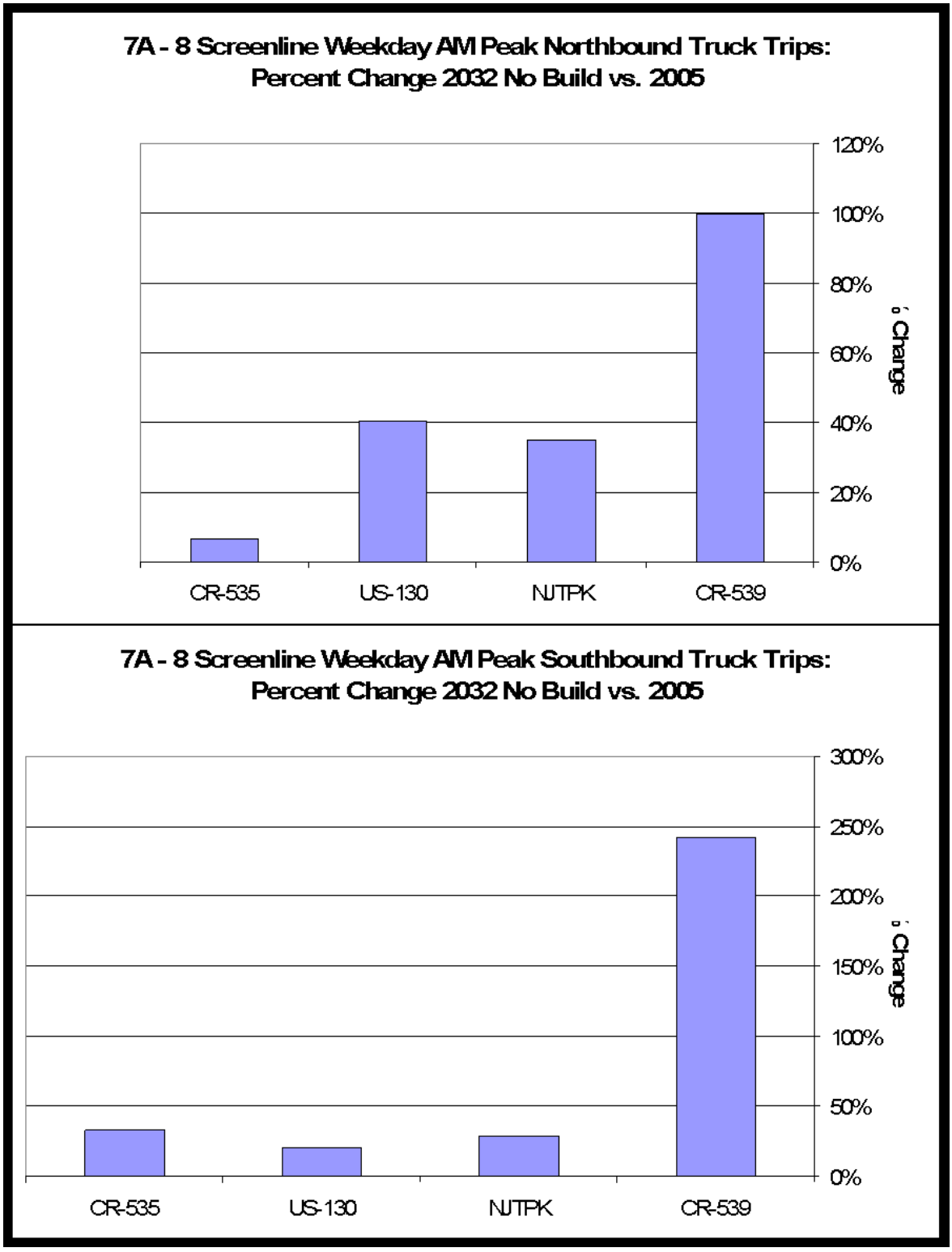


CHANGE IN NO BUILD SCREENLINE 7A-8 VOLUMES (2005-2032)
FRIDAY PM PEAK HOUR AUTO TRIPS

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
4-6

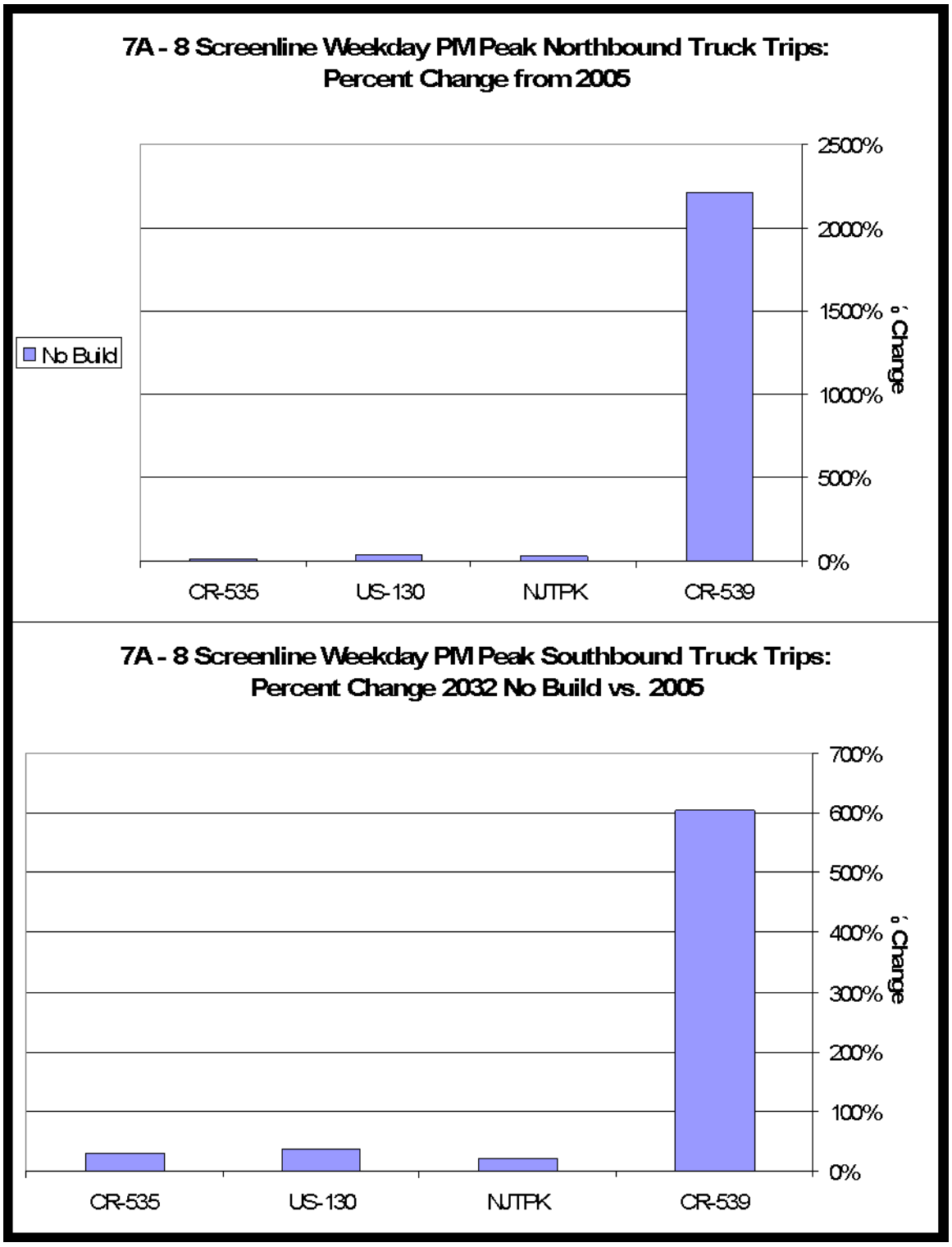


CHANGE IN NO BUILD SCREENLINE 7A-8 VOLUMES (2005-2032)
WEEKDAY AM PEAK HOUR TRUCK TRIPS

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
4-7

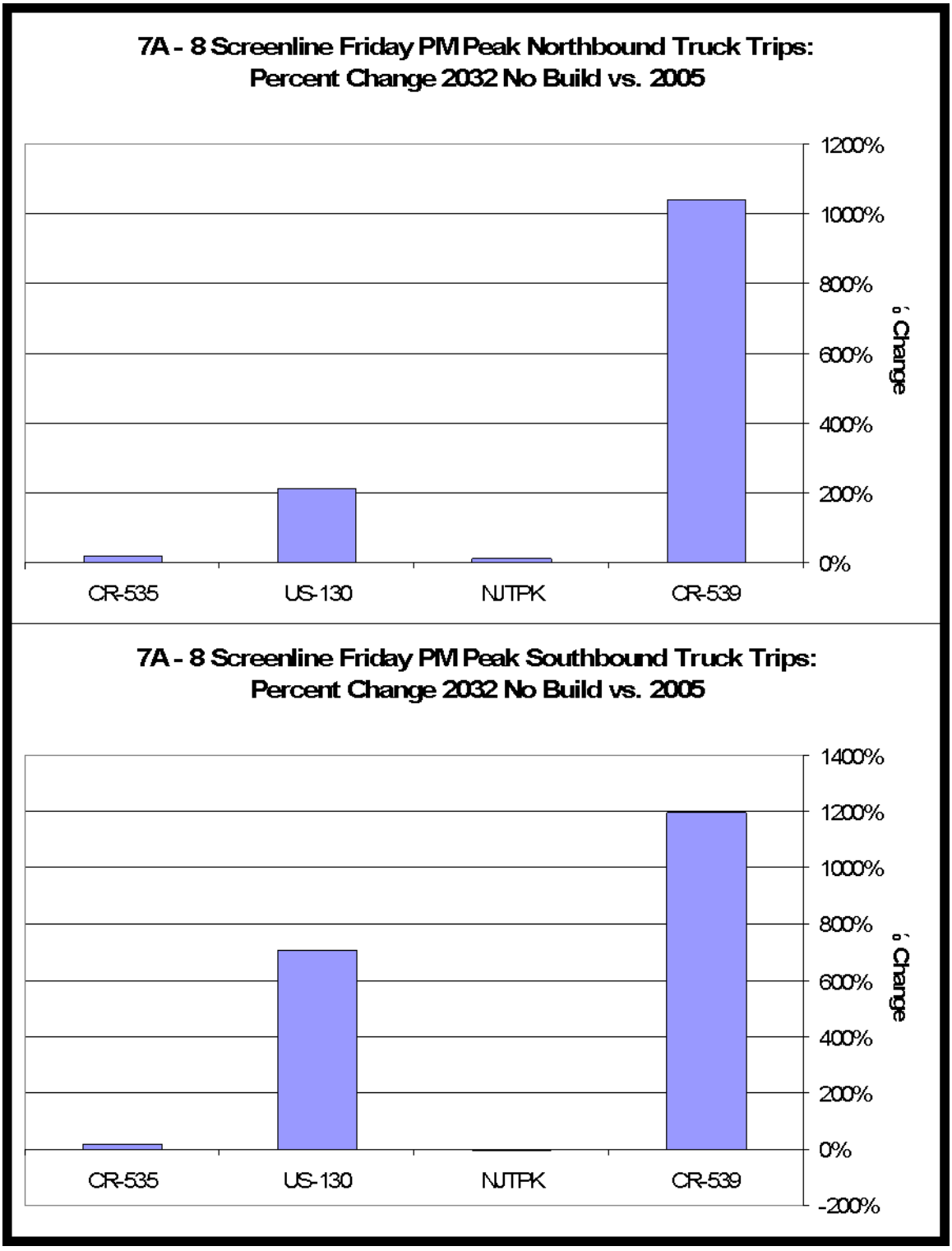


CHANGE IN NO BUILD SCREENLINE 7A-8 VOLUMES (2005-2032)
WEEKDAY PM PEAK HOUR TRUCK TRIPS

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
4-8

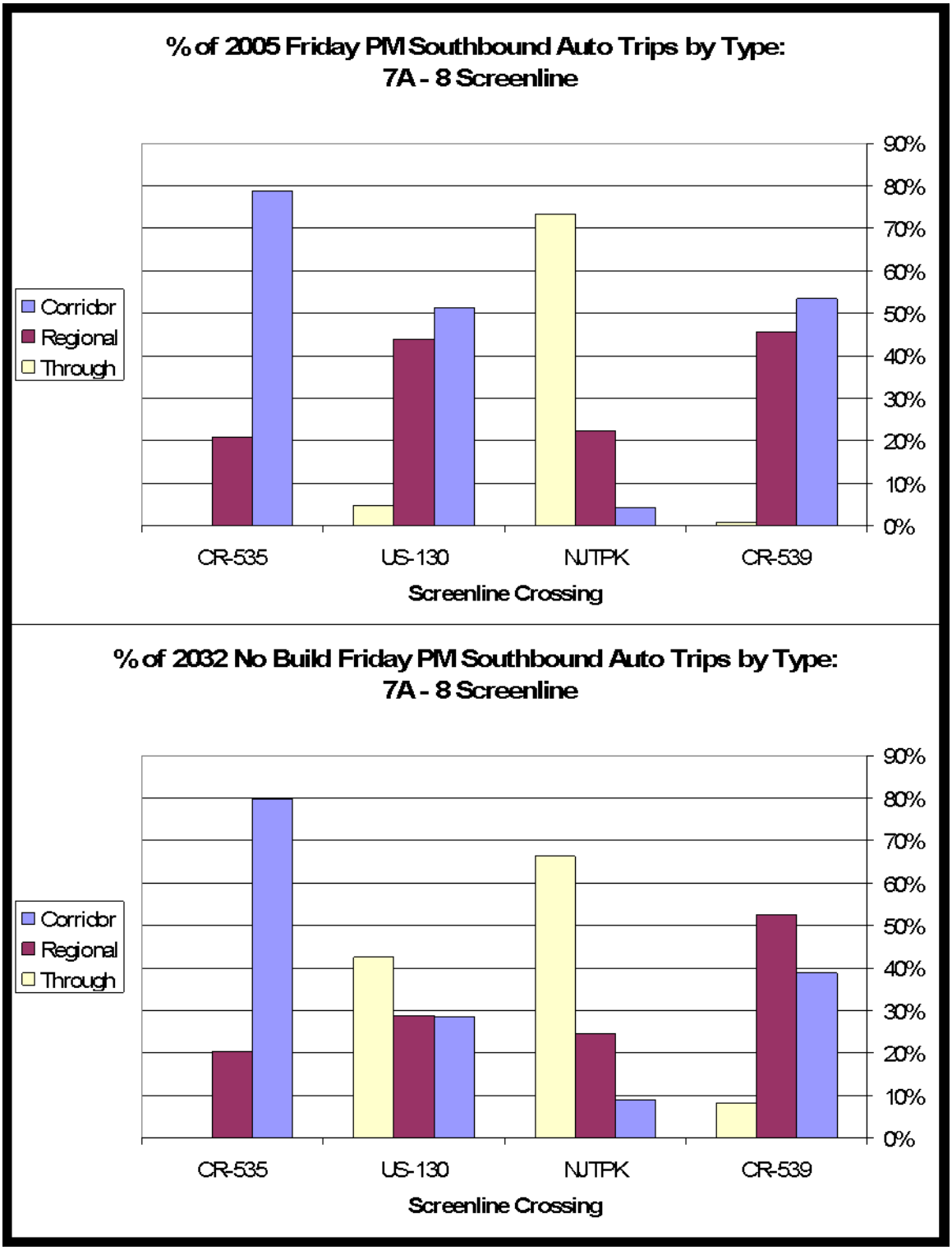


CHANGE IN NO BUILD SCREENLINE 7A-8 VOLUMES (2005-2032)
FRIDAY PM PEAK HOUR TRUCK TRIPS

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
4-9

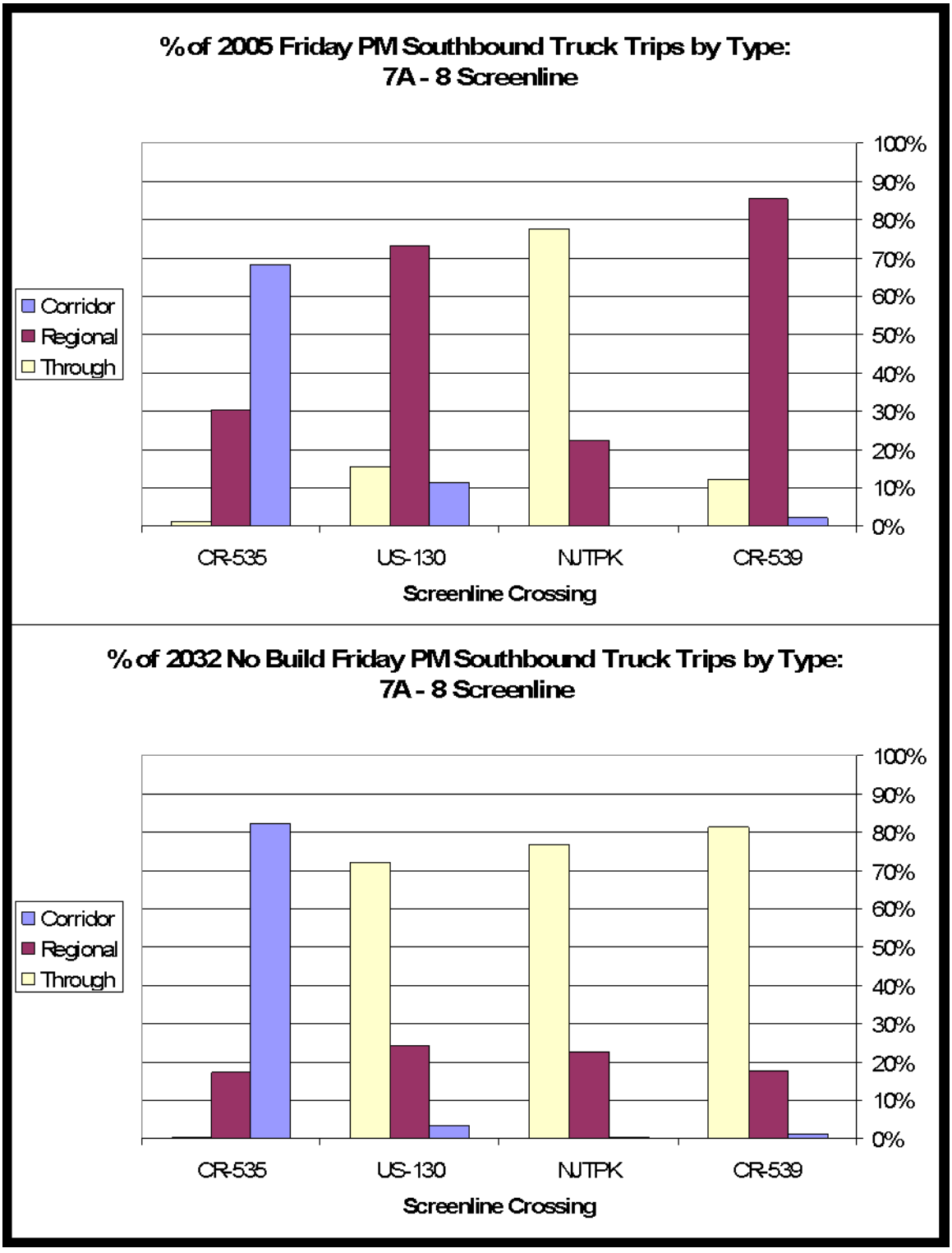


COMPARISON OF 2005 AND 2032 NO BUILD SCREENLINE
7A-8 VOLUMES:
PERCENT BY TRIP - FRIDAY PM PEAK HOUR
SOUTHBOUND AUTO TRIPS

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
4-10

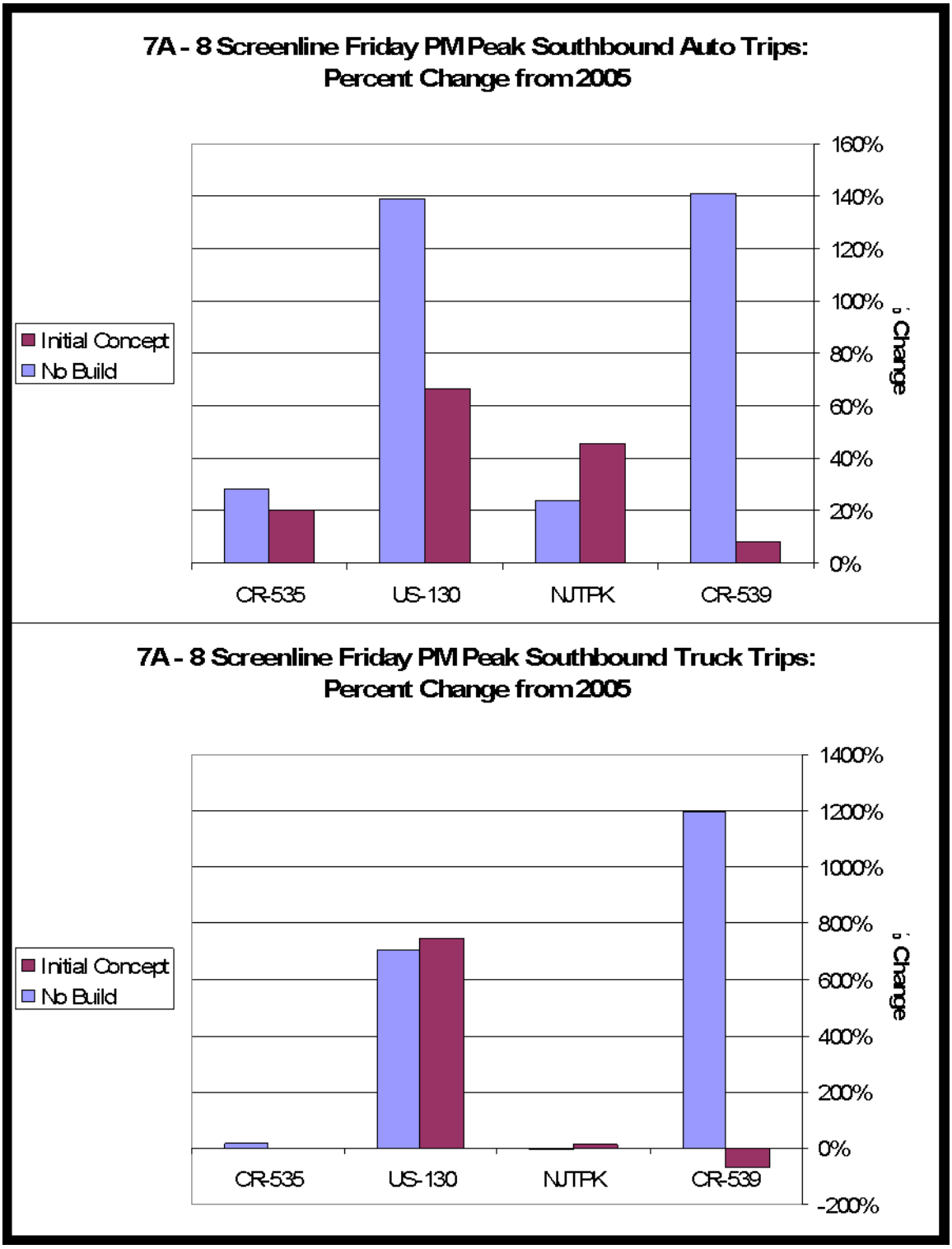


COMPARISON OF 2005 AND 2032 NO BUILD SCREENLINE
7A-8 VOLUMES:
PERCENT BY TRIP - FRIDAY PM PEAK HOUR
SOUTHBOUND TRUCK TRIPS

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
4-11

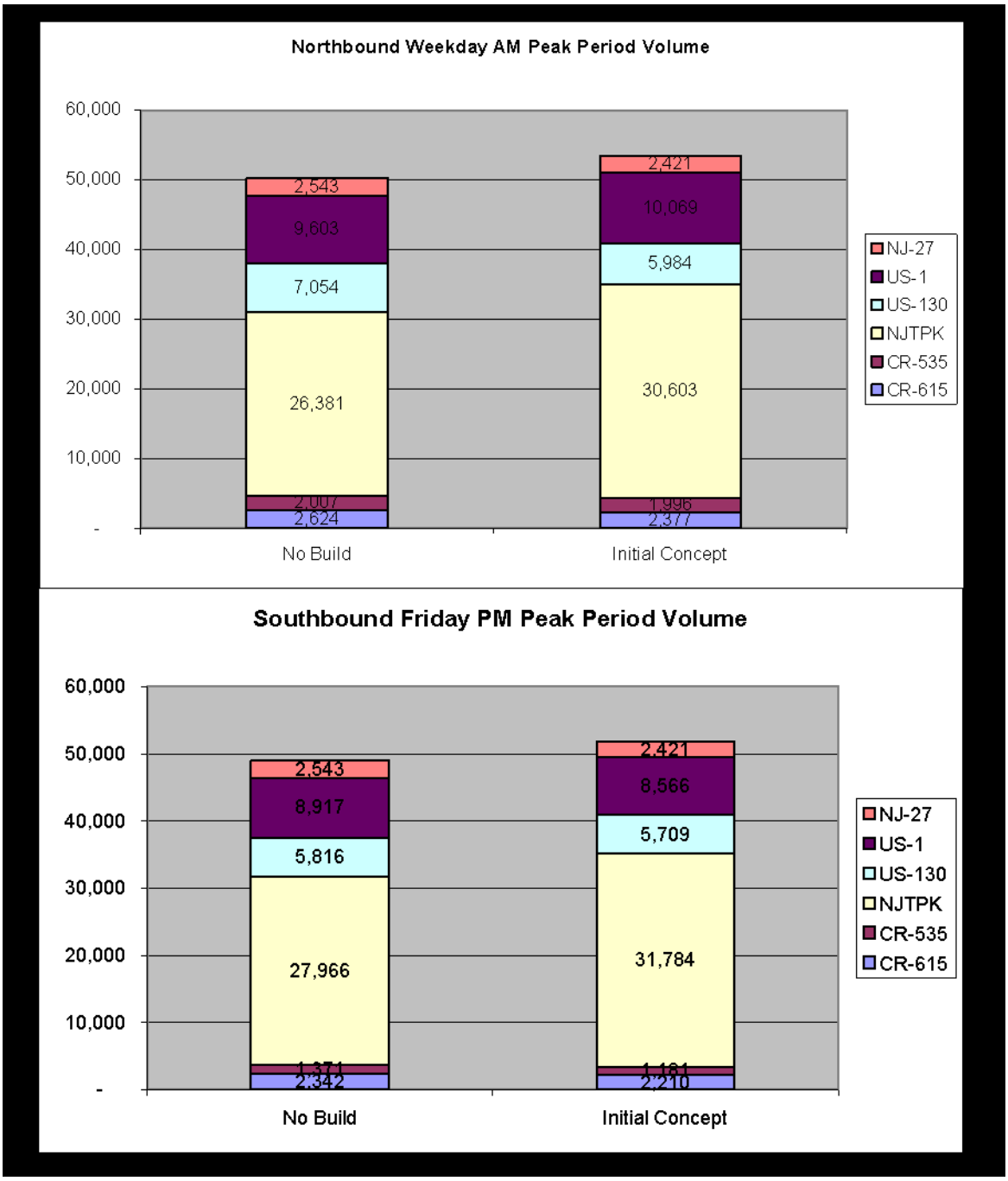


COMPARISON OF 2005 AND 2032 NO BUILD SCREENLINE
7A-8 VOLUMES:
PERCENT BY TRIP - FRIDAY PM PEAK HOUR
SOUTHBOUND AUTO AND TRUCK TRIPS

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
4-12

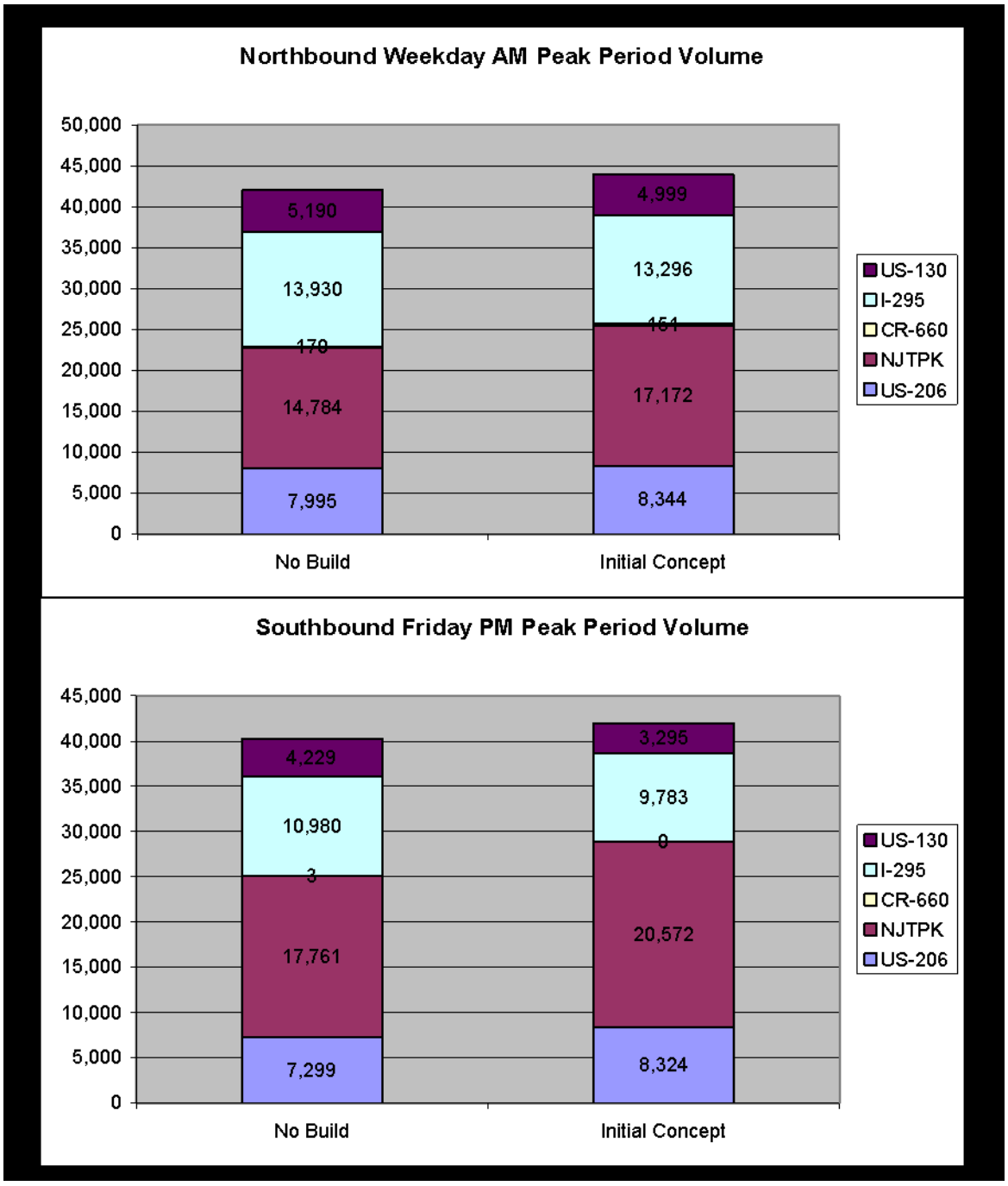


2032 SCREENLINE 8A-9 NO BUILD AND BUILD VOLUMES BY ROUTE:
NORTHBOUND WEEKDAY AM AND
SOUTHBOUND FRIDAY PM PEAK PERIODS

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
4-13



2032 SCREENLINE 6-7 NO BUILD AND BUILD VOLUMES BY ROUTE:
NORTHBOUND WEEKDAY AM AND
SOUTHBOUND FRIDAY PM PEAK PERIODS

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
4-14

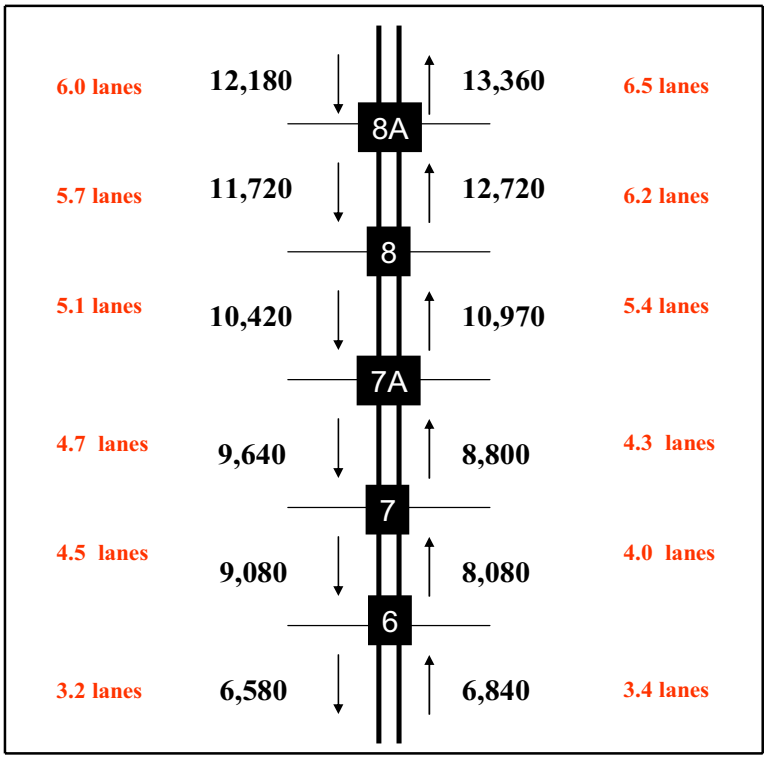
and southbound Friday PM peak period volumes for the PHMTE Connection – Interchange 7 screenline (Figure 4-13) and the Interchange 8A – Interchange 9 screenline (Figure 4-14). The total volume of vehicles crossing the screenlines during the peak periods are consistently several thousand vehicles higher under the Build Condition. This is noteworthy given the total number of trips between each origin and destination pair remains unchanged between the No-Build and Build Conditions. This is likely due to traffic diversion from roads outside of the screenlines to the improved Turnpike.

Due to the Proposed Project, the largest projected traffic diversions to the Turnpike will originate from U.S. Route 130, a heavily traveled north-south route located just to the west of the Turnpike. Additional routes that are projected to experience decreases in volume under the Build Condition are C.R. 539, C.R. 535, and C.R. 615. The section of U.S. Route 206 south of Interchange 7 is expected to experience an increase in traffic since it is a feeder road to the Turnpike.

4.17.5 2032 Mainline Lane Requirements

For each Turnpike mainline segment between Interchanges 5 and 9, the highest projected peak hour Passenger Car Equivalent (PCE) volume was used to determine the 2032 mainline lane requirements. A maximum LOS of "D" – service volume of 2,040 PCE/lane/hour was assumed (derived from the 2000 Highway Capacity Manual for freeway sections on level terrain). Figure 4-15 shows the number of mainline lanes in each direction required to maintain LOS D during the design hour.

Figure 4-15
2032 (Design Hour) Turnpike Lane Requirements
Between Interchanges 5 to 9 to Maintain LOS D



South of Interchange 6, a minimum of 3.2 lanes is required in the southbound direction and 3.4 lanes in the northbound direction. Between Interchange 6 and Interchange 7A, 4.5 to 4.7 lanes are required in the southbound direction and 4.0 to 4.3 lanes in the northbound direction. North of Interchange 7A,

traffic volumes are heavier and lane requirements are higher. A total of 5.1 to 6.0 lanes are required in the southbound direction and 5.4 to 6.5 lanes in the northbound direction. For planning purposes, the minimum lane requirements for each Turnpike segment are rounded upwards to the nearest number of full lanes (i.e. 5.4 to 6.0). These lane calculations give planners a general indication of what projected traffic conditions will be like in 2032.

4.17.6 Travel Time Analysis

To demonstrate the potential benefits of the Proposed Project and the need to accommodate expected travel growth in the Project Corridor, the travel model was used to estimate changes in peak hour travel times that can be expected in the future under both the No-Build and Build Conditions (without N.J. Route 92).

Estimated peak hour travel times were derived from the model runs in both directions between four points located to the south or west of the Project Corridor:

1. Route I-95 south of Wilmington, Delaware
2. Cherry Hill, New Jersey
3. Northeast Philadelphia, Pennsylvania
4. Trenton, New Jersey

In addition, estimated peak hour travel times were derived from the model runs in both directions between two points located to the north or east of the Project Corridor:

1. New Brunswick, New Jersey
2. Route I-95/George Washington Bridge, NJ/NY

These origin-destination pairs were selected to illustrate changes in travel time. However, it should be noted that many other origin-destination pairs will also experience changes in travel time. Table 4.79 shows the projected 2005 peak hour travel times between the selected origin-destination pairs.

To verify the travel times estimated by the model, the 2005 peak hour travel times were compared with point-to-point travel times from a readily-available source – *Mapquest.com*. The model-estimated travel times ranged from 6 percent higher in comparison to the times reported by *Mapquest.com* (for a weekday PM peak hour trip from Delaware to New Brunswick) to 51 percent higher than the *Mapquest.com* provided time (for a weekday AM peak hour trip from Trenton to New Brunswick), with a median of 20 percent. This was considered reasonable for a mix of peak-direction and reverse-peak-direction movements in the Project Corridor.

Table 4.80 shows the model-estimated peak hour travel times for the 2032 No-Build Condition and the projected changes in total time and percentage relative to 2005 conditions. For all origin-destination pairs, peak hour travel times are projected to increase, from 10 minutes to 36 minutes, with a median increase of 17.6 minutes. As a percentage of the estimated 2005 peak hour travel times, the estimated 2032 No-Build Condition peak hour travel times are projected to increase in the range of 11 percent to 40 percent, with a median increase of 19 percent.

Table 4.81 shows the model-estimated peak hour travel times for the 2032 Build Condition and the projected changes in total time and percentage relative to 2005 conditions. For all origin-destination pairs with the Turnpike widening in place, peak hour travel times are projected to decrease by 2 minutes for two of the travel times and increase a maximum of 21 minutes for the rest. The estimated median change is an increase of 6.3 minutes. As a percentage of the estimated 2005 peak hour travel

Table 4.79
Estimated 2005 Peak Hour NJ Turnpike Travel Times
Between Selected Origin-Destination Pairs

Origin	Destination	2005 Estimated Peak Hour Travel Time (Minutes)		
		Weekday AM	Weekday PM	Friday PM
I-95 (S. of Wilmington, DE)	New Brunswick, NJ	111	106	108
	I-95/GWB, NY/NJ	158	152	155
Cherry Hill, NJ	New Brunswick, NJ	75	70	72
	I-95/GWB, NY/NJ	121	116	119
North Philadelphia, PA	New Brunswick, NJ	73	68	71
	I-95/GWB, NY/NJ	120	115	117
Trenton, NJ	New Brunswick, NJ	57	48	49
	I-95/GWB, NY/NJ	104	94	96
New Brunswick, NJ	I-95 (S. of Wilmington, DE)	119	118	120
	Cherry Hill, NJ	74	72	75
	North Philadelphia, PA	77	70	73
	New Brunswick, NJ	54	48	51
I-95/GWB, NY/NJ	I-95 (S. of Wilmington, DE)	161	165	168
	Cherry Hill, NJ	117	119	123
	North Philadelphia, PA	115	117	122
	New Brunswick, NJ	97	96	99

Source: The Louis Berger Group, Inc. 2006.

times, the estimated 2032 Build Condition peak hour travel times are projected to range from a decrease of 4 percent to an increase of 14 percent, with a median change increase of 7 percent.

4.17.7 Mitigation of Impacts

The Proposed Project will result in the widening of the Turnpike from six lanes (three lanes in each direction) to twelve lanes (six lanes in each direction), which will bring about improvements in roadway geometry and configuration, and ultimately a reduction in traffic congestion. This is confirmed by the significant impact analysis, which shows that the LOS for most Turnpike roadway segments and ramp junctions are projected to decline or remain unchanged from the No-Build Condition to the Build Condition. Because no adverse impacts are anticipated, no mitigation measures for the Proposed Project are required.

4.18 Air Quality

4.18.1 Introduction

An air quality analysis was performed to determine if the Proposed Project would affect ambient air quality in the Project Corridor and vicinity. New Jersey requires that an air quality impact analysis be conducted to assess the significance of a project's impact by predicting air pollutant concentrations with a screening or a microscale hot-spot analysis, as well as a regional emission evaluation using available documentation. To determine possible impacts on project areas and the nearby environment, NJDEP's Division of Air Quality established a guideline entitled *Air Quality Analysis for Intersections (*NJDEP,

Table 4.80
Estimated 2032 No-Build Peak Hour Travel Time Between Selected Origin-Destination Pairs
Comparison With 2005 Peak Hour Travel Times

Origin	Destination	2032 No-Build Estimated Peak Hour Travel Time			Travel Time Change 2032 No-Build vs. 2005			% Travel Time 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	111	106	108	30.1	16.7	19.2	28.5%	15.8%	17.7%
	I-95/GWB, NY/NJ	158	152	155	35.9	20.3	23.5	23.6%	13.4%	15.2%
Cherry Hill, NJ	New Brunswick, NJ	75	70	72	24.9	12.9	16.1	35.6%	18.4%	22.3%
	I-95/GWB, NY/NJ	121	116	119	30.6	16.4	20.5	26.3%	14.1%	17.3%
North Philadelphia, PA	New Brunswick, NJ	73	68	71	27.4	14.2	16.1	40.1%	20.8%	22.8%
	I-95/GWB, NY/NJ	120	115	117	33.2	17.7	20.4	28.9%	15.4%	17.4%
Trenton, NJ	New Brunswick, NJ	57	48	49	18.8	9.2	11.8	39.5%	19.3%	24.0%
	I-95/GWB, NY/NJ	104	94	96	24.9	12.6	16.2	26.5%	13.4%	16.9%
New Brunswick, NJ	I-95 (S. of Wilmington, DE)	119	118	120	23.9	26.7	28.6	20.3%	22.7%	23.8%
	Cherry Hill, NJ	74	72	75	11.0	11.3	12.5	15.3%	15.7%	16.7%
	North Philadelphia, PA	77	70	73	15.0	14.4	15.6	21.3%	20.4%	21.4%
	New Brunswick, NJ	54	48	51	10.4	11.2	11.8	21.5%	23.1%	23.0%
I-95/GWB, NY/NJ	I-95 (S. of Wilmington, DE)	161	165	168	26.0	30.2	34.1	15.8%	18.3%	20.3%
	Cherry Hill, NJ	117	119	123	13.1	14.8	18.0	11.0%	12.4%	14.6%
	North Philadelphia, PA	115	117	122	22.2	17.9	20.2	18.9%	15.2%	16.5%
	New Brunswick, NJ	97	96	99	12.5	14.7	17.4	13.1%	15.4%	17.5%

Source: The Louis Berger Group, Inc. 2006.

Table 4.81
Estimated 2032 Build Peak Hour Travel Time Between Selected Origin-Destination Pairs
Comparison With 2005 Peak Hour Travel Times

Origin	Destination	2032 Build Estimated Peak Hour Travel Time			Travel Time Change 2032 Build vs. 2005			% Travel Time Change 2032 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, NY/NJ	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, NY/NJ	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, NY/NJ	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, NY/NJ	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%
	New Brunswick, NJ	65	60	63	10.4	11.2	11.8	21.5%	23.1%	23.0%
I-95/GWB, NY/NJ	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%
	New Brunswick, NJ	110	110	117	12.5	14.7	17.4	13.1%	15.4%	17.5%

Source: The Louis Berger Group, Inc. 2006.

May 2004, Revised*)* that provides specific methodologies to be followed. These analysis methodologies and procedures are consistent with the *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (U.S. EPA Publication EPA-454/R-92-005), as well as the *User's Guide to Mobile6.2: Mobile Source Emission Factor Model* (U.S. EPA Publication EPA-420-R-02-028) and the *User's Guide to CAL3QHC, Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*. The impact analysis for the Proposed Project began with a screening-level analysis based on the locations of sensitive receptors, traffic levels of service, and other project-related traffic components. Unless a screening result can conclude that insignificant impacts to air quality would result, quantitative analyses are required by NJDEP to further determine both the potential impact and beneficial effect of a proposed project.

4.18.2 Data Sources and Methodology

Air quality impact analyses were conducted by evaluating a series of project-related information, including the preliminary design plans, traffic information, and construction information. The analysis was conducted for Turnpike segments and nearby intersections that could potentially be affected by the Proposed Project. The Proposed Project's preliminary design plans were reviewed to identify sensitive areas within the Project Corridor and to determine their distances from the proposed roadway improvements. Sensitive areas and receptors include residences, schools, nursing homes, parks, recreation areas, hospitals and any location associated with the young, elderly or infirmed. These areas or receptors were then examined for traffic conditions including changes in levels of service, traffic volumes, congestion, etc. Based on a review of the screening results, predicted traffic volumes and relative distances between receptors and roadways, a series of potential "hot-spot" analysis sites were selected for quantitative analyses. These locations include immediately adjacent sites that would experience direct impact as well as the sites near other roadways or facilities that would be significantly affected by the Proposed Project. Ten analysis sites, including Turnpike interchanges, local intersections, and roadway segments, were selected for hot-spot analysis. Among them, seven were Turnpike interchanges and service areas which represent the areas where the highest possible impacts may occur, and three local intersection sites represent those typical locations where beneficial effects on air quality are expected to result. For each analysis site, at least 20 receptor locations were used in the modeling for the ambient air quality impact evaluation. Receptors at each analyzed interchange or intersection site were placed in reasonable locations based on the NJDEP guideline.

For the impact analysis, the seven analysis sites are:

- Interchange 6 at the PHMTE Connection and adjacent areas;
- Interchange 7 and adjacent areas;
- Service Areas 6N & 6S;
- Interchange 7A and adjacent areas;
- Interchange 8 and adjacent areas;
- Service Area 7S; and
- Interchange 8A and adjacent areas.

For the beneficial effect analysis, the three analysis sites are:

- The interchange of U.S. Route 130 and Route I-295, located to the south of U. S. Route 206 and west of Turnpike Interchange 7, Bordentown, Burlington County.
- Old York Road (County Route CR-539), located to the south of Turnpike Interchange 8 between East Windsor and Hightstown, Mercer County.
- The intersection of U.S. Route 130 and N.J. Route 32, west of Turnpike Interchange 8A, South Brunswick, Middlesex County.

The carbon monoxide (CO) and particulates ($PM_{2.5}$) analyses for the estimated time of completion (ETC) year 2012, with and without the Proposed Project, were conducted by using NJDEP and U.S. EPA protocols as described above. The specific traffic information and survey data used included traffic volumes, vehicle classifications (car, SUV, light truck, medium truck, heavy truck, and bus, etc.), travel speeds, turning movements (movement per lane), capacity, levels of service (LOS), signal timing, saturation flow, roadway geometry at analyzed intersections or interchanges, and vehicle trips generated or decreased by the Proposed Project, as provided by the Proposed Project's traffic report, supplemented by a review of documents published by NJDOT. The emission factor calculation and air quality impact evaluation were completed in accordance with the U.S. EPA publication AP-42, *Compilation of Air Pollutant Emission Factors - Second Edition, Mobile Source Emissions Model* (Latest Version, MOBILE6.2), and *CAL3QHC/R Dispersion Model*. The microscale analysis for CO and $PM_{2.5}$ concentrations using weekday AM, weekday PM, Friday PM, and weekend peak hour traffic information were conducted using the worst-case assumptions based on the NJDEP and NJDOT guidelines and protocols described above. The calculated CO and $PM_{2.5}$ emission factors were input into the most recent dispersion models by phasing in Turnpike and local roadway geometry at various scenarios.

New Jersey survey data of vehicle miles traveled (VMT), engine operating temperature during various time periods (daytime and nighttime), vehicle registration and distribution data, and emission conformity analysis data from NJDOT, NJTPA and DVRPC were also assembled for project analysis use. For assessing cumulative effects, data regarding other on-going and future projects nearby was collected from sponsors of the applicable projects, including such information as project descriptions, design and engineering plans, schedule, their environmental issues and construction management plans, etc., when available.

The modeling input and output files are contained in Appendix E.

4.18.3 Air Quality Impacts Analysis Results

While regional or mesoscale burdens, including the Proposed Project's potential emissions, were analyzed by the Metropolitan Planning Organizations (MPOs) and have been included in the Transportation Improvement Program (TIP) conformity determination, the most important localized air pollutants relevant to the Proposed Project (CO and $PM_{2.5}$) were analyzed on a microscale level. These analyses were conducted because ambient concentrations of CO and PM are predominantly influenced by mobile source emissions.

To evaluate ambient concentrations and potential project impacts, a series of mobile source microscale analyses was performed in accordance with EPA, NJDEP and NJDOT requirements and procedures. The future ETC (Estimated Time of Completion) year 2012 ambient air quality conditions with and without the Proposed Project in the areas along Turnpike segments and near other affected roadways within Burlington, Mercer, and Middlesex Counties were examined.

Emission calculations for the ETC year 2012 were performed. These calculations utilized the traffic data (AM peak, PM peak, Friday peak, and weekend peak) and survey data as inputs to the EPA models. Prediction of motor vehicle-generated pollutant concentrations is characterized by examination of meteorology, traffic conditions and physical configurations. Procedures for determining maximum one-hour and eight-hour CO concentrations followed the guidelines developed by the NJDEP. Except for data obtained from the Proposed Project's traffic analysis, regional summaries of traffic were used in the emissions analysis, also based on NJDEP guidelines. Vehicular emissions were first determined mathematically as a function of vehicle speed and classification, ambient temperature and other factors. A dispersion model was then employed to simulate mathematically how traffic, meteorology and geometry combine to affect pollutant concentrations. Emission factors were calculated by utilizing the

EPA's computerized mobile source emissions model, *MOBILE6.2*, for estimating the composite vehicular emission factors. These factors were then multiplied by traffic volumes to determine free-flow corridor source strength and idle emissions. A mathematical model, *CAL3QHC* (Version 2.0, EPA-404/12-92-006), was used to calculate the predicted air constituent concentrations. CAL3QHC is a state-of-the-art dispersion model widely used for predicting pollutant concentrations near roadway segments and intersections. This model assumes that the dispersion of pollutants downwind of a source follow a Gaussian distribution. Each lane of traffic is modeled as a straight, continuous, finite line source with a uniform emission rate. The downwind CO and PM concentrations can be calculated by numerical integration along the line source.

A microscale analysis was conducted for CO and $PM_{2.5}$ concentrations for worst-case peak hour periods (AM, PM, Friday PM, and weekend) under various scenarios. Prior to modeling, a review of regional information, air quality background, meteorological data, and State Implementation Plan (SIP) information was conducted to determine the analysis' assumptions and parameters. Following the recommendations contained in the NJDEP guidelines, the analysis utilized the worst-case winter temperatures; an atmospheric stability class E (5) for rural areas and D (4) for urban areas; a roughness length of 108 centimeters for suburban or rural locations; a wind speed of 1 meter/second (m/s); a mixing height of 1,000 meters; and a wind angle search at 5 degree increments to determine the highest concentration. Using CAL3QHC, the air impact concentrations for the interchanges or intersections, and sensitive areas were predicted. The background concentration levels were added to the CAL3QHC modeling results to obtain total pollutant concentrations at a prediction site. These total concentrations were then compared to the NAAQS. Based on NJDEP guidelines, the default CO background concentrations of 3.0 parts per million (ppm) and 2.1 ppm, respectively, for 1-hour and 8-hour levels were used for suburban areas. For $PM_{2.5}$, the second highest 24-hour monitored value, 28 $\mu g/m^3$ and annual average value, 12.7 $\mu g/m^3$, obtained from NJDEP's 2005 monitoring network were used as 24-hour and annual average background concentrations, respectively.

The total ambient concentrations were obtained by adding the CAL3QHC predicted impacts to the background levels. These total CO levels were compared to the NAAQS of 35 and 9 ppm for the peak one-hour and eight-hour periods, respectively, for compliance demonstration proposes. The total $PM_{2.5}$ levels were compared to the NAAQS of 65 $\mu g/m^3$ and 15 $\mu g/m^3$ for the 24-hour and annual average periods, respectively.

4.18.3.1 Predicted Carbon Monoxide Concentrations

Total ambient CO 1-hour and 8-hour concentrations under 2012 No-Build and Build conditions are summarized in Table 4.82 and Table 4.83, respectively. The CO impacts of the Proposed Project are also determined by calculating the differences between the Build and No-Build concentrations, as shown in Table 4.84 and Table 4.85. The predicted CO concentrations at each of the impact analysis sites are described below.

Interchange 6

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 5.20 ppm and 3.64 ppm, respectively, while the NAAQS for one-hour and eight-hour CO concentrations are 35 ppm and 9 ppm, respectively.

Table 4.82
Predicted 2012 Maximum Carbon Monoxide Concentration
1-hour Concentration (ppm)

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
Interchange 6	5.20	5.60	35.0
Interchange 7	6.30	6.60	35.0
Service Area 6N / 6S	5.50	6.80	35.0
Interchange 7A	6.30	7.50	35.0
Interchange 8	5.70	5.80	35.0
Service Area 7S	7.00	6.30	35.0
Interchange 8A	7.20	8.80	35.0

Notes:
a. ppm = parts per million
b. Including 1-hour CO background concentrations 3.0 ppm
c. NAAQS (National Ambient Air Quality Standard) for 1-hr CO = 35 ppm
Source: The Louis Berger Group, Inc., April 2006

Table 4.83
Predicted 2012 Maximum Carbon Monoxide Concentration
8-hour Concentration (ppm)

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
Interchange 6	3.64	3.92	9.0
Interchange 7	4.41	4.62	9.0
Service Area 6N / 6S	3.85	4.76	9.0
Interchange 7A	4.41	5.25	9.0
Interchange 8	3.99	4.06	9.0
Service Area 7S	4.90	4.41	9.0
Interchange 8A	5.04	6.16	9.0

Notes:
a. ppm = parts per million
b. Including 1-hour CO background concentrations 3.0 ppm
c. NAAQS (National Ambient Air Quality Standard) for 1-hr CO = 35 ppm
Source: The Louis Berger Group, Inc., April 2006

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of one-hour or eight-hour NAAQS for CO at any sites were predicted. The predicted Maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 5.60 ppm and 3.92 ppm, respectively. The worst-case 1-hour and 8-hour CO impacts resulting from the Proposed Project are 0.40 ppm and 0.28 ppm, respectively. The project's impact is determined by calculating the difference between the Build and No-Build concentrations. These impact concentrations are less than the NJDEP significance thresholds of 1.6 ppm for 1-hour CO and 0.4 ppm for 8-hour CO. Therefore, the air quality impact of the Proposed Project at this site is not significant.

Table 4.84
Predicted 2012 Maximum Carbon Monoxide Impact from Project
1-hour CO Impact (ppm)

Predicted Site / Interchange Area	2012 Impact	NJDEP Threshold
Interchange 6	0.40	1.6
Interchange 7	0.30	1.6
Service Area 6N / 6S	1.30	1.6
Interchange 7A	1.20	1.6
Interchange 8	0.10	1.6
Service Area 7S	-0.70*	1.6
Interchange 8A	1.60	1.6

Notes:
a. ppm = parts per million
b. Calculating from difference between 2012 Build and No-Build concentrations
c. NJDEP Threshold for significant CO impact (1-hour) = 1.6 ppm
*: Beneficial effect occurs at this site
Source: The Louis Berger Group, Inc., April 2006

Table 4.85
Predicted 2012 Maximum Carbon Monoxide Impact from Project
8-hour CO Impact (ppm)

Predicted Site / Interchange Area	2012 Impact	NJDEP Threshold
Interchange 6	0.28	0.4
Interchange 7	0.21	0.4
Service Area 6N / 6S	0.91	0.4
Interchange 7A	0.84	0.4
Interchange 8	0.07	0.4
Service Area 7S	-0.49*	0.4
Interchange 8A	1.12	0.4

Notes:
a. ppm = parts per million
b. Calculating from difference between 2012 Build and No-Build concentrations
c. NJDEP Threshold for significant CO impact (8-hour) = 0.4 ppm
*: Beneficial effect occurs at this site
Source: The Louis Berger Group, Inc., April 2006

Interchange 7

The worst-case 2012 No-Build concentrations are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO at any receptors of this site were predicted. The predicted maximum one-hour and eight-hour total CO concentrations are 6.30 ppm and 4.41 ppm, respectively, which are well below NAAQS for CO.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any sites. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 6.60 ppm and 4.62 ppm, respectively. Thus, the worst-case 1-hour and 8-hour CO impacts of the Proposed Project are 0.30 ppm and 0.21ppm, respectively. These impacts concentrations are less

than the NJDEP significance thresholds. Therefore, the air quality impact of the Proposed Project at this site is not significant.

Service Areas 6N & 6S

In the 2012 No-Build worst-case condition, all estimated concentrations at this site are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 5.50 ppm and 3.85 ppm, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any sites. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 6.80 ppm and 4.76 ppm, respectively, which are below the NAAQS for CO. The worst-case 1-hour and 8-hour CO impacts of the Proposed Project are 1.30 ppm and 0.91 ppm, respectively. The 1-hour concentration is below the NJDEP significance threshold; however, the 8-hour concentration is above the threshold. Therefore, the Proposed Project would result in a significant air quality impact at this site.

Interchange 7A

All estimated 2012 No-Build concentrations are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO at any receptors of this site were predicted. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 6.30 ppm and 4.41 ppm, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO at any sites were predicted. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 7.50 ppm and 5.25 ppm, respectively. The worst-case 1-hour and 8-hour CO impacts of the Proposed Project are 1.20 ppm, and 0.84 ppm, respectively. The 1-hour concentration is below the NJDEP significance threshold; however the 8-hour concentration is above the threshold. Therefore, the Proposed Project would result in a significant air quality impact at this site.

Interchange 8

In the 2012 No-Build condition, all estimated concentrations are below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 5.70 ppm and 3.99 ppm, respectively.

All estimated 2012 Build concentrations are also below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any sites. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 5.80 ppm and 4.06 ppm, respectively. The resulting worst-case 1-hour and 8-hour CO impacts of the Proposed Project are 0.10 ppm and 0.07 ppm, respectively. These concentrations are less than the NJDEP significance thresholds. Therefore, the air quality impact of the Proposed Project at this site is not significant.

Service Area 7S

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 7.00 ppm and 4.90 ppm, respectively.

In the 2012 Build worst-case condition, all estimated concentrations are also below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO at any sites were predicted. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 6.30 ppm and 4.41 ppm, respectively. These concentrations represent an improvement in CO at this receptor location in the Build condition. The 1-hour and 8-hour CO beneficial effect of the Proposed Project is 0.70 ppm, and 0.49 ppm, respectively.

Interchange 8A

All estimated 2012 No-Build concentrations are below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 7.20 ppm and 5.04 ppm, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO at any sites were predicted. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 8.80 ppm and 6.16 ppm, respectively. The resulting worst-case 1-hour and 8-hour CO impacts of the Proposed Project are 1.60 ppm and 1.12 ppm, respectively. These concentrations are greater than the NJDEP significance thresholds. Therefore, the Proposed Project would result in a significant air quality impact at this site.

4.18.3.2 Predicted Particulate Matter (PM2.5) Concentrations

The total ambient $PM_{2.5}$ concentrations were obtained by adding the CAL3QHC/R predicted values to the background levels. The total $PM_{2.5}$ concentrations were then compared to the NAAQS of 65 $\mu g/m^3$ and 15 $\mu g/m^3$ for the 24-hour and annual average periods, respectively, to determine compliance.

Total ambient $PM_{2.5}$ concentrations are summarized in Table 4.86 and Table 4.87. The $PM_{2.5}$ impacts of the Proposed Project are determined by calculating the differences between the Build and No-Build concentrations, as shown in Table 4.88 and Table 4.89. The predicted $PM_{2.5}$ concentrations at each of the impacted sites are in compliance with the NAAQS for $PM_{2.5}$ and are described below.

Interchange 6

In the 2012 No-Build worst-case condition, all estimated concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted at any receptors of this site. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location are 29.60 $\mu g/m^3$ and 13.02 $\mu g/m^3$, respectively.

In the 2012 Build worst-case condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted at any sites. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 30.00 $\mu g/m^3$ and 13.10 $\mu g/m^3$, respectively. The worst-case 24-hour and annual

Table 4.86
Predicted 2012 Maximum Particulates (PM2.5) Concentration
24-hour Concentration (μg/m^3)

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
Interchange 6	29.60	30.00	65.0
Interchange 7	30.40	30.80	65.0
Service Area 6N / 6S	30.00	30.80	65.0
Interchange 7A	30.80	31.60	65.0
Interchange 8	30.00	30.40	65.0
Service Area 7S	31.20	30.40	65.0
Interchange 8A	30.80	31.60	65.0

Notes:
a. μg/m^3 = micro-gram per cubic meter
b. Including 24-hour $PM_{2.5}$ background concentrations 28 μg/m^3
c. NAAQS (National Ambient Air Quality Standard) for 24-hr $PM_{2.5}$ = 65 μg/m^3
Source: The Louis Berger Group, Inc., April 2006

Table 4.87
Predicted 2012 Maximum Particulates (PM2.5) Concentration
Annual Average Concentration (μg/m^3)

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
Interchange 6	13.02	13.10	15.0
Interchange 7	13.18	13.26	15.0
Service Area 6N / 6S	13.10	13.26	15.0
Interchange 7A	13.26	13.42	15.0
Interchange 8	13.10	13.18	15.0
Service Area 7S	13.34	13.18	15.0
Interchange 8A	13.26	13.42	15.0

Notes:
a. μg/m^3 = micro-gram per cubic meter
b. Including annual average $PM_{2.5}$ background concentrations 12.7 μg/m^3
c. NAAQS (National Ambient Air Quality Standard) for annual average $PM_{2.5}$ = 15 μg/m^3
Source: The Louis Berger Group, Inc., April 2006

Table 4.88
Predicted 2012 Maximum Particulates (PM2.5) Impact from Project
24-hour Impact (μg/m^3)

Predicted Site / Interchange Area	2012 Impact	NJDEP Threshold
Interchange 6	0.40	5.0
Interchange 7	0.40	5.0
Service Area 6N / 6S	0.80	5.0
Interchange 7A	0.80	5.0
Interchange 8	0.40	5.0
Service Area 7S	-0.80*	5.0
Interchange 8A	0.80	5.0

Notes:
a. μg/m^3 = micro-gram per cubic meter
b. Calculating from difference between 2012 Build and No-Build concentrations
c. NJDEP Threshold for significant $PM_{2.5}$ impact (24-hour) = 5 μg/m^3
*: Beneficial effect occurs at this site
Source: The Louis Berger Group, Inc., April 2006

Table 4.89
Predicted 2012 Maximum Particulates (PM2.5) Impact from Project
Annual Average Impact (μg/m^3)

Predicted Site / Interchange Area	2012 Impact	NJDEP Threshold
Interchange 6	0.08	1.0
Interchange 7	0.08	1.0
Service Area 6N / 6S	0.16	1.0
Interchange 7A	0.16	1.0
Interchange 8	0.08	1.0
Service Area 7S	-0.16*	1.0
Interchange 8A	0.16	1.0

Notes:
a. μg/m^3 = micro-gram per cubic meter
b. Calculating from difference between 2012 Build and No-Build concentrations
c. NJDEP Threshold for significant $PM_{2.5}$ impact (annual average) = 1 μg/m^3
*: Beneficial effect occurs at this site
Source: The Louis Berger Group, Inc., April 2006

average $PM_{2.5}$ impacts of the Proposed Project are 0.40 μg/m^3 and 0.08 μg/m^3, respectively. These impact concentrations are less than the NJDEP thresholds for the prevention of significant deterioration. The 24-hour threshold is 5 μg/m^3 for $PM_{2.5}$ and the annual average threshold is 1 μg/m^3. Therefore, the PM impact of the Proposed Project at this site is not significant.

Interchange 7

The worst-case 2012 No-Build concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total $PM_{2.5}$ concentrations are 30.40 μg/m^3 and 13.18 μg/m^3, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted at any sites. The predicted maximum 24-hour and annual average total $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 30.80 $\mu g/m^3$ and 13.26 $\mu g/m^3$, respectively. Thus, the worst-case 24-hour and annual average $PM_{2.5}$ impacts of the Proposed Project are 0.40 $\mu g/m^3$ and 0.08 $\mu g/m^3$, respectively. These concentrations are less than the NJDEP significance thresholds. Therefore, the PM impact of the Proposed Project at this site is not significant.

Service Areas 6N & 6S

In the worst-case 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS at any receptors of this site were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location are 30.00 $\mu g/m^3$ and 13.10 $\mu g/m^3$, respectively.

In the 2012 Build worst-case condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS at any sites were predicted. The predicted maximum 24-hour or annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 30.80 $\mu g/m^3$ and 13.26 $\mu g/m^3$, respectively. The worst-case 24-hour or annual average $PM_{2.5}$ impacts of the Proposed Project are 0.80 $\mu g/m^3$ and 0.16 $\mu g/m^3$. These concentrations are less than the NJDEP significance thresholds. Therefore, the PM impact of the Proposed Project at this site is not significant.

Interchange 7A

The worst-case 2012 No-Build concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations are 30.80 $\mu g/m^3$ and 13.26 $\mu g/m^3$, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of 24-hour or annual average NAAQS were predicted. The predicted maximum 24-hour and annual average total $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 31.60 $\mu g/m^3$ and 13.42 $\mu g/m^3$, respectively. Thus, the worst-case 24-hour and annual average $PM_{2.5}$ impacts of the Proposed Project are 0.80 $\mu g/m^3$ and 0.16 $\mu g/m^3$, respectively. These concentrations are less than the NJDEP significance thresholds. Therefore, the PM impact of the Proposed Project at this site is not significant.

Interchange 8

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of 24-hour or annual average NAAQS at any receptors of this site were predicted. The predicted maximum 24-hour and annual average total $PM_{2.5}$ concentrations at the worst-case receptor location are 30.00 $\mu g/m^3$ and 13.10 $\mu g/m^3$, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted at any sites. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 30.40 $\mu g/m^3$ and 13.18 $\mu g/m^3$, respectively. The worst-case 24-hour and annual average $PM_{2.5}$ impact of the Proposed Project is 0.40 $\mu g/m^3$ and 0.08 $\mu g/m^3$, respectively. These concentrations are less than the NJDEP significance thresholds. Therefore, the PM impact of the Proposed Project at this site is not significant.

Service Area 7S

The worst-case 2012 No-Build concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted. The predicted maximum the 24-hour and annual average $PM_{2.5}$ concentrations are 31.20 $\mu g/m^3$ and 13.34 $\mu g/m^3$, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted at any sites. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 30.40 $\mu g/m^3$ and 13.18 $\mu g/m^3$, respectively. These concentrations represent an improvement in PM at this receptor location in the Build condition. The 24-hour and annual average $PM_{2.5}$ beneficial effects of the Proposed Project are 0.80 $\mu g/m^3$ and 0.16 $\mu g/m^3$, respectively. Therefore, the PM impact of the Proposed Project at this site is not significant.

Interchange 8A

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location are 30.80 $\mu g/m^3$ and 13.26 $\mu g/m^3$, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS were predicted at any sites. The predicted maximum 24-hour or annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 31.60 $\mu g/m^3$ and 13.42 $\mu g/m^3$, respectively. The worst-case 24-hour and annual average $PM_{2.5}$ impacts of the Proposed Project are 0.80 $\mu g/m^3$ and 0.16 $\mu g/m^3$, respectively. These concentrations are less than the NJDEP significance thresholds. Therefore, the PM impact of the Proposed Project at this site is not significant.

4.18.4 Beneficial Effects Analysis Results

The Proposed Project would also provide traffic benefits to certain local roads and nearby highways due to the reduced traffic volumes that would result on these roadways. Therefore, beneficial air quality effects resulting from improved traffic conditions on these roadways are expected to result from the Proposed Project. CO and $PM_{2.5}$ were analyzed on a microscale level by utilizing the same procedures as those for the impact evaluation for Turnpike interchanges and service areas above. The future ETC 2012 ambient air quality conditions with and without the Proposed Project for the affected local roadways were examined. The analysis sites included: the Interchange of U.S. Route 130 and Interstate Route I-295 in Bordentown, Burlington County; Old York Road (County Route CR-539) in East Windsor, Mercer County; and Intersection of U. S. Route 130 and Route 32, in South Brunswick, Middlesex County.

Emission factors were calculated by utilizing the EPA's computerized mobile source emissions model MOBILE6.2, and a dispersion model CAL3QHC to predict air constituent concentrations. The traffic data were obtained from the NJDOT surveyed data and published documents. The background concentration levels were added to the CAL3QHC modeling results to obtain total pollutant concentrations at a prediction site for comparing to the NAAQS. Similar to the impact analysis, the NJDEP Guideline default CO backgrounds of 3.0 ppm and 2.1 ppm, respectively, for 1-hour and 8-hour levels, were used. For $PM_{2.5}$, the second highest 24-hour monitored value 28 of $\mu g/m^3$ and annual average value 12.7 $\mu g/m^3$ were used as 24-hour and annual average background concentrations, respectively.

The total ambient concentrations were obtained by adding the CAL3QHC predicted impacts to the background levels. These total CO levels were compared to the NAAQS of 35 and 9 ppm for the peak one-hour and eight-hour periods, respectively. The total $PM_{2.5}$ levels were compared to the NAAQS of 65 $\mu g/m^3$ and 15 $\mu g/m^3$ for the 24-hour and annual average periods, respectively.

4.18.4.1 Predicted Beneficial Carbon Monoxide Concentrations

The total ambient CO concentrations resulting from beneficial effect analysis are summarized in Table 4.90 and Table 4.91, respectively, for 1-hour and 8-hour concentrations under both 2012 No-Build and 2012 Build conditions. The CO beneficial effects of the Proposed Project are also determined by calculating the differences between the Build and No-Build concentrations, as shown in Table 4.92 and Table 4.93, respectively, for 1- and 8-hour CO beneficial effects resulting from the Proposed Project.

Table 4.90
Predicted 2012 Maximum Carbon Monoxide Concentration
1-Hour Concentration (ppm)[b]

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
U.S. 130 & I-295	8.20	7.40	35.0
Old York Road (CR 539)	3.50	3.00	35.0
U.S. 130 & Route 32	6.10	5.50	35.0

Notes:
a. ppm = parts per million
b. Including 1-hour CO background concentrations 3.0 ppm
c. NAAQS (National Ambient Air Quality Standard) for 1-hr CO = 35 ppm
Source: The Louis Berger Group, Inc., April 2006

Table 4.91
Predicted 2012 No-Build Maximum Carbon Monoxide Concentration
8-Hour Concentration (ppm) [b]

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
U.S. 130 & I-295	5.74	5.18	9.0
Old York Road (CR 539)	2.45	2.10	9.0
U.S. 130 & Route 32	4.27	3.85	9.0

Notes:
a. ppm = parts per million
b. Including 8-hour CO background concentrations 2.1 ppm
c. NAAQS (National Ambient Air Quality Standard) for 8-hr CO = 9 ppm
Source: The Louis Berger Group, Inc., April 2006

U.S. Route 130 and Route I-295

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 8.20 ppm and 5.74 ppm, respectively.

Table 4.92
Predicted 2012 Carbon Monoxide Beneficial Effect
1-Hour CO (ppm)

Predicted Site / Interchange Area	2012 Beneficial Effect	NJDEP Threshold
U.S. 130 & I-295	0.8	1.6
Old York Road (CR 539)	0.5	1.6
U.S. 130 & Route 32	0.6	1.6

Notes:
a. ppm = parts per million
b. Beneficial Effects mean Build Concentrations are lower than No-Build concentrations
c. NJDEP Threshold for significant CO impact (1-hour) = 1.6 ppm
Source: The Louis Berger Group, Inc., April 2006

Table 4.93
Predicted 2012 Carbon Monoxide Beneficial Effect
8-Hour CO (ppm)

Predicted Site / Interchange Area	2012 Beneficial Effect	NJDEP Threshold
U.S. 130 & I-295	0.56	0.40
Old York Road (CR 539)	0.35	0.40
U.S. 130 & Route 32	0.42	0.40

Notes:
a. ppm = parts per million
b. Beneficial Effects mean Build Concentrations are lower than No-Build concentrations
c. NJDEP Threshold for significant CO impact (1-hour) = 0.40 ppm
Source: The Louis Berger Group, Inc., April 2006

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted. The predicted maximum one-hour and eight-hour CO concentrations at the worst-case receptor location of this site are 7.40 ppm and 5.18 ppm, respectively. The resulting 1-hour and 8-hour beneficial effects of the Proposed Project are 0.80 ppm and 0.56 ppm, respectively.

Old York Road (CR-539)

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted at any receptors of this site. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location are 3.50 ppm and 2.45 ppm, respectively.

In the 2012 condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted. The predicted maximum one-hour and eight-hour total CO concentrations at the worst-case receptor location of this site are 3.00 ppm and 2.10 ppm, respectively.

The resulting 1-hour and 8-hour beneficial effects of the Proposed Project are 0.50 ppm and 0.35 ppm, respectively.

U. S. Route 130 and N.J. Route 32

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of one-hour or eight-hour NAAQS for CO were predicted. The predicted maximum one-hour and eight-hour CO concentrations at the worst-case receptor location are 6.10 ppm and 4.27 ppm, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the one-hour or eight-hour NAAQS for CO were predicted. The predicted maximum one-hour and eight-hour CO concentrations at the worst-case receptor location of this site are 5.50 ppm and 3.85 ppm, respectively.

The resulting 1-hour and 8-hour beneficial effects of the Proposed Project are 0.60 ppm, and 0.42 ppm, respectively.

4.18.4.2 Predicted Beneficial Particulate Matter (PM2.5) Concentrations

The total ambient $PM_{2.5}$ concentrations at the selected sites where the beneficial effect analysis was performed were determined by adding the CAL3QHC/R predicted $PM_{2.5}$ values to the background levels. The total $PM_{2.5}$ concentrations were then compared to the NAAQS of 65 $\mu g/m^3$ and 15 $\mu g/m^3$ for the 24-hour and annual average periods, respectively, for determining compliance. The total ambient $PM_{2.5}$ concentrations at the selected sites are summarized in Table 4.94 and Table 4.95.

The beneficial $PM_{2.5}$ effects of the Proposed Project are determined by calculating the differences between the Build and No-Build concentrations, as shown in Table 4.96 and Table 4.97. The predicted $PM_{2.5}$ concentrations at each of the analysis sites are described below.

Table 4.94
Predicted 2012 Maximum Particulates ($PM_{2.5}$) Concentration
24-hour Concentration ($\mu g/m^3$)

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
U.S. 130 & I-295	31.6	31.2	65.0
Old York Road (CR 539)	28.4	28.0	65.0
U.S. 130 & Route 32	30.0	29.6	65.0

Notes:
a. $\mu g/m^3$ = micro-gram per cubic meter
b. Including 24-hour $PM_{2.5}$ background concentrations 28 $\mu g/m^3$
c. NAAQS (National Ambient Air Quality Standard) for 24-hr $PM_{2.5}$ = 65 $\mu g/m^3$
Source: The Louis Berger Group, Inc., April 2006

U.S. Route 130 and Route I-295

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted at any receptors of this site. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location are 31.60 $\mu g/m^3$ and 13.42 $\mu g/m^3$, respectively.

Table 4.95
Predicted 2012 Maximum Particulates ($PM_{2.5}$) Concentration
Annual Average Concentration ($\mu g/m^3$)

Predicted Site / Interchange Area	2012 No-Build	2012 Build	NAAQS
U.S. 130 & I-295	13.42	13.34	15.0
Old York Road (CR 539)	12.78	12.70	15.0
U.S. 130 & Route 32	13.10	13.02	15.0

Notes:
a. $\mu g/m^3$ = micro-gram per cubic meter
b. Including annual average $PM_{2.5}$ background concentrations 12.7 $\mu g/m^3$
c. NAAQS (National Ambient Air Quality Standard) for annual average $PM_{2.5}$ = 15 $\mu g/m^3$
Source: The Louis Berger Group, Inc., April 2006

Table 4.96
Predicted 2012 Particulates ($PM_{2.5}$) Beneficial Effect from Project
24-Hour PM2.5 ($\mu g/m^3$)

Predicted Site / Interchange Area	2012 Beneficial Effect	NJDEP Threshold
U.S. 130 & I-295	0.40	5.0
Old York Road (CR 539)	0.40	5.0
U.S. 130 & Route 32	0.40	5.0

Notes:
a. $\mu g/m^3$ = micro-gram per cubic meter
b. Beneficial Effects mean Build Concentrations are lower than No-Build concentrations
c. NJDEP Threshold for significant $PM_{2.5}$ impact (24-hour) = 5 $\mu g/m^3$
Source: The Louis Berger Group, Inc., April 2006

Table 4.97
Predicted 2012 Particulates ($PM_{2.5}$) Beneficial Effect from Project
Annual Average PM2.5 ($\mu g/m^3$)

Predicted Site / Interchange Area	2012 Beneficial Effect	NJDEP Threshold
U.S. 130 & I-295	0.08	1.0
Old York Road (CR 539)	0.08	1.0
U.S. 130 & Route 32	0.08	1.0

Notes:
a. $\mu g/m^3$ = micro-gram per cubic meter
b. Beneficial Effects mean Build Concentrations are lower than No-Build concentrations
c. NJDEP Threshold for significant $PM_{2.5}$ impact (annual average) = 1 $\mu g/m^3$
Source: The Louis Berger Group, Inc., April 2006

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 31.20 $\mu g/m^3$ and 13.34 $\mu g/m^3$, respectively. The 24-hour and annual average $PM_{2.5}$ beneficial effect of the Proposed Project is 0.40 $\mu g/m^3$ and 0.08 $\mu g/m^3$, respectively. These concentrations are less than the NJDEP significance thresholds of 5 $\mu g/m^3$ for 24-hour PM and 1 $\mu g/m^3$ for annual average PM.

Old York Road (CR-539)

In the 2012 No-Build condition, all estimated concentrations are well below the standards, and no exceedances of 24-hour or annual average NAAQS for $PM_{2.5}$were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location are 28.40 $\mu g/m^3$ and 12.78 $\mu g/m^3$, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 28.00 $\mu g/m^3$ and 12.70 $\mu g/m^3$, respectively. The beneficial effect of the Proposed Project is 0.4 $\mu g/m^3$ and 0.08 $\mu g/m^3$, respectively. These concentrations are less than the NJDEP significance thresholds.

U. S. Route 130 and N.J. Route 32

The 2012 No-Build concentrations are well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted. The predicted maximum one-hour and eight-hour $PM_{2.5}$ concentrations are 30.00 $\mu g/m^3$ and 13.10 $\mu g/m^3$, respectively.

In the 2012 Build condition, all estimated concentrations are also well below the standards, and no exceedances of the 24-hour or annual average NAAQS for $PM_{2.5}$ were predicted. The predicted maximum 24-hour and annual average $PM_{2.5}$ concentrations at the worst-case receptor location of this site are 29.60 $\mu g/m^3$ and 13.02 $\mu g/m^3$, respectively. Thus, the beneficial effect of the Proposed Project is 0.40 $\mu g/m^3$ (24-hour) and 0.08 $\mu g/m^3$ (annual average). These concentrations are less than the NJDEP significance thresholds.

4.18.5 Conformity Statement and Regional Emission Analysis

Section 176(c) of the Clean Air Act (42 U.S.C. 7506) requires all regional transportation plans, activities and programs in nonattainment or maintenance areas to conform to the applicable State Implementation Plan (SIP). EPA has developed criteria and procedures for determining conformity. These federal air quality requirements are promulgated in *Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans of Transportation Plans, Programs and Projects Funded or Approved Under Title 23 USC or the Federal Transit Act (40 CFR Parts 51 and 93) and Amendments* (August 15, 1997 and July 1, 2004). As a regionally significant action, the Proposed Project has been included in the mesoscale emission burden analyses of the Draft FY 2006 – 2008 Transportation Improvement Program (TIP) approved by NJTPA and the Draft Destination 2030 Long-Range Plan prepared by DVRPC. Any regional TIP or Regional Transportation Plan (RTP) approved by either MPO is considered to be in conformance with the SIP if this plan or program, which includes all regionally significant projects, will not: cause or contribute to any new violation of the standard; or increase the frequency or severity of any existing violation; or delay timely attainment of the standards. As a conformity analysis procedure required by MPOs, all significant New Jersey Turnpike projects are included in regional or mesoscale emission analyses. The mesoscale emission burden analyses for ozone and its precursors completed by the MPOs cover all milestone years including baseline 2005, 1-hour ozone attainment year 2007, 8-hour ozone attainment year 2010 and 2014, future horizon years 2015 and 2025. Thus, the mesoscale emissions of the Proposed Project meet the regional compliance requirement.

4.18.6 Compliance with Project-Level Conformity Criteria

While regional or mesoscale burdens, including the Proposed Project, were analyzed by the MPOs and have been included in the TIP conformity determination, the most important localized air pollutants relevant to the Proposed Project, CO and $PM_{2.5}$, were analyzed on a microscale level. These analyses were conducted because ambient concentrations of CO and PM are predominantly influenced by mobile source emissions.

The microscale analysis results presented above show that the estimated CO and $PM_{2.5}$ concentrations are well below the standards, and no exceedances of the NAAQS at any analysis sites were predicted. As such, the Proposed Project will not interfere with other projects in the transportation plan. Therefore, the Proposed Project will not have an adverse impact on air quality. Thus, the Proposed Project meets all requirements for not creating any new violation, nor increasing the frequency or severity of any existing violations of the NAAQS. Therefore, the Proposed Project complies with the Clean Air Act.

4.18.7 Construction Impacts

Construction-related impacts are short-term and include PM in the form of dust (from ground clearing and preparation, grading, stockpiling of materials, on-site movement of equipment and transportation of construction materials), as well as exhaust emissions from material delivery trucks, construction equipment and worker's private vehicles. Dust emissions typically occur during dry weather and periods of maximum demolition or construction activity or high wind conditions.

The construction management of the Proposed Project can include general environmental measures imposed on contractors. Construction work would be planned and executed in a manner that will minimize air emissions and will be accomplished in light of the site's proximity to users of the surrounding environment. Specific air quality control measures may include:

- Use of low-sulfur diesel fuel in construction equipment.
- Limit unnecessary idling times on diesel powered engines to 5 - 10 minutes.
- Locate diesel powered exhausts away from local residential or building air intakes.
- Limit on-site equipment to operating speeds of 5 MPH to eliminate dust and PM pollutants from tires and brakes.
- Control dust through a plan for control of spraying of a suppressing agent on any dust pile; control or containment of fugitive dust; and; and adjustment for meteorological conditions as appropriate.
- Water or appropriate liquids would be utilized for dust control during demolition, land clearing, grading; and on materials stockpile or surface; and other activities.
- Open-body trucks for transporting materials would be covered.
- Surface materials would be removed promptly.

4.18.8 Summary

The microscale analysis results described above show that the CO and $PM_{2.5}$ concentrations estimated to result from the Proposed Project are well below the standards, and no exceedances of the NAAQS at any analysis sites were predicted. While the Proposed Project would have impacts on the areas immediately adjacent to interchanges and service areas, it would also produce beneficial effects on local roadways and other highway systems. Therefore, the Proposed Project would not have an adverse impact on air quality, and would not create any new violation, nor increase the frequency or severity of

any existing violations of the NAAQS standard. Therefore, the Proposed Project complies with the Clean Air Act.

4.19 Noise

4.19.1 Introduction

The New Jersey Turnpike Authority, in its current *Policy for Construction of Noise Barriers in Residential Areas*, has adopted criteria for impact determination and noise barrier consideration along the Turnpike, including criteria specifically related to new construction or widening projects. These criteria are applicable to, and have been utilized as a part of, the noise analysis for the Proposed Project.

The Policy states that the Authority shall only consider construction of noise barriers as part of a new construction or widening project when either of the following conditions is met:

- Noise levels are projected by the Authority to exceed 66 dBA Leq in the design year during the peak noise hour at the exterior of existing homes located in proximity to the Turnpike right-of-way; or,

- Noise levels are projected by the Authority to increase by at least 10 dBA Leq from the existing year-of-study condition to the design year during the peak noise hour at the exterior of existing homes located in proximity to the Turnpike right-of-way.

Should either of the above conditions be met, the Authority will then consider the construction of a noise barrier conditioned upon several additional criteria, as follows:

- The barrier must be able to reduce noise levels at homes in closest proximity to the Turnpike right-of-way at the time of project completion by at least 5 dBA, although the goal of the reduction is 10 dBA;

- The construction cost of the barrier must not exceed $50,000 per dwelling unit receiving noise reduction benefit;

- Construction of the proposed barrier must be feasible from an engineering perspective in the sole opinion of the Authority;

- The height of the barrier shall not exceed 20 feet, unless the Authority determines that extraordinary circumstances justify a higher barrier in a particular case; and

- Any other factors or procedures deemed necessary or appropriate by the Authority.

Any location that meets the criteria would be recommended for noise barrier construction as part of a new construction or widening project. This section identifies those neighborhoods that meet either or both of the noise level criteria for defining a noise impact, and also identifies those neighborhoods that meet the several criteria for noise barrier recommendation.

4.19.2 Data Sources and Methodology

Modeling of future No-Build and Build conditions was conducted by utilizing the Federal Highway Administration's (FHWA's) *Traffic Noise Model (TNM) 2.5*. Specific roadway geometric data and

elevation data inputs were calculated and utilized in addition to the roadway centerline, receptor location and traffic data. *Traffic Noise CAD*, in conjunction with *AUTOCAD*, was utilized to "digitize" roadway geometry and elevations as well as receptor elevations based on information from the Proposed Project's preliminary design plans. These plans (1"=100' scale) and profiles (1"=100' scale) provided the roadway's horizontal and vertical data. Ground elevation information was accurate to the one-foot interval contour level. Additional receptors located further from the Turnpike were digitized from 1"=100' scale aerial photography.

Existing traffic data were obtained from the *Draft Final Traffic Analysis Report* (March 2006) prepared for the Proposed Project, including peak hour volumes, daily volumes, weekly volumes, and vehicle composition, which were used to establish traffic conditions. Existing (2005) toll counts for all interchanges within the Project Corridor, as well as mainline traffic volumes and directional distributions were provided by the Authority. This information was utilized to calculate traffic volume distributions on inner and outer roadways as well as entrance and exit ramps.

Future traffic volumes for the 2032 No-Build and Build conditions were obtained from data provided in the *Traffic Analysis Report*. It was assumed for purposes of making traffic projections that the volume distributions and vehicle mix in the future will remain essentially the same as those in the existing condition. The future traffic volumes, along with travel speeds, were used as inputs to the TNM model. In general, the traffic noise modeling process incorporates a large number of variables that describe various types of vehicles operating at different speeds through a continuously changing highway configuration and surrounding terrain.

Representative receptor points for individual residences, or clusters of residences in the case of townhomes, were included in the model to assess future noise levels. The number of sensitive receptors with noise levels of 66 dBA or greater in the design year, which indicated the total noise level impact, was estimated based on the TNM modeling results.

Once it was determined through modeling that a neighborhood would be impacted by traffic noise in the design year, a noise barrier analysis was conducted to evaluate the reasonableness and feasibility of the proposed noise barrier. In terms of feasibility, each barrier was evaluated with a goal of achieving a 10 dBA noise reduction, but with a minimum of 5 dBA reduction. In terms of reasonableness, or cost-effectiveness, each barrier was evaluated to determine if its cost was less than $50,000 per dwelling unit receiving benefit. Any dwelling that was found to be impacted and that would receive a 3 dBA noise level reduction counted as a full credit in the cost-effectiveness calculation. Any dwelling that was found not to be impacted but would receive a 3 dBA noise level reduction counted as one-half credit in the cost-effectiveness calculation. The barrier cost calculation was based on a factor of $40/square foot.

A range of potential heights was examined for each barrier (e.g., 8 to 20 feet at two foot intervals) as appropriate, to a maximum of 20 feet. For each barrier analyzed, the height was assumed to be uniform for its entire length. Due to actual topographic differences on the ground along each barrier length, however, some variations in height would likely be required in the as-built condition. Refinement of the actual barrier dimensions that would be required along individual segments will be provided as part of the Proposed Project's final design process. Noise barrier analysis tables are contained in Appendix F.

In the No-Build Alternative, several of the existing noise barriers located near monitored residences were modeled using their existing heights. These barriers will continue to provide some reduction of noise levels for those residences in close proximity to the Turnpike.

4.19.3 No-Build Alternative

The 2032 No-Build Alternative assumes that the Proposed Project would not be undertaken and the Turnpike would remain in its current configuration. The No-Build Alternative would result in an increase in traffic volumes and traffic congestion; however, the traffic noise level, which is directly related to both traffic volume and speed, would increase due to the higher traffic volumes but may not increase during periods of increased congestion, due to the decreased travel speeds. Therefore, traffic noise levels at receptor locations in the No-Build alternative would essentially be the same as, or worse than, existing traffic noise levels. Individual receptor locations are discussed below and the actual modeled No-Build noise levels at each location are presented in Table 4.98.

Table 4.98
Existing and Future Noise Levels at Monitored Receptor Sites
2032 No-Build Alternative

Interchange	Site ID	AM Peak Period			PM Peak Period		
		2006 Existing Leq	2032 No-Build Leq	dBA Difference	2006 Existing Leq	2032 No-Build Leq	dBA Difference
6 to 7	**1**	55.4	64.6	9.2	55.1	63.9	8.8
7 to 7A	**2**	65.2	69.1	3.9	61.5	68.0	6.5
	2A	63.5	60.2	-3.3	64.3	59.4	-4.9
	3	72.6	76.3	3.7	73.5	75.3	1.8
	4	73.4	73.3	-0.1	70.7	72.2	1.5
	5	64.7	69.1	4.4	64.7	67.3	2.6
	6	56.6	65.8	9.2	57.3	64.1	6.8
	7	72.2	73.7	1.5	70.1	72.7	2.6
7A to 8	**8**	66.4	71.2	4.8	66.4	70.2	3.8
	9	57.0	59.3	2.3	56.5	58.5	2.0
	10	57.2	65.6	8.4	58.1	64.6	6.5
	11	64.1	65.6	1.5	67.7	64.8	-2.9
	12	66.8	67.6	0.8	66.0	66.9	0.9
	13	76.8	77.4	0.6	76.3	76.7	0.4
	14	59.7	59.9	-0.2	58.6	59.4	0.8
	15	69.6	75.9	6.3	69.0	75.0	6.0
8 to 8A	**16**	75.8	76.3	-0.5	75.1	75.2	0.1
	17	56.4	50.8	-5.6	57.5	49.8	-7.7
	18	56.7	59.9	3.2	57.7	58.8	1.1
Max		76.8	77.4	9.2	76.3	76.7	8.8
Min		55.4	50.8	-5.6	55.1	49.8	-7.7

Source: The Louis Berger Group, Inc., June 2006.

4.19.3.1 Interchange 6 to Interchange 7

Site No. 1

Site No. 1 is a residence located at 817 Hedding – Mansfield Road in Mansfield Township (M.P. 51.4 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (64.6 dBA) is predicted to increase by 9.2 dBA from the existing AM peak noise level (55.4 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the No-Build condition, the PM peak traffic noise level is predicted to increase to 63.9 dBA, which is a difference of 8.8 dBA from the existing PM peak noise level (55.1 dBA).

4.19.3.2 Interchange 7 to Interchange 7A

Site No. 2

Site No. 2 is a residence located at 6 David Court in Bordentown Township (M.P. 54.6 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (69.1 dBA) is predicted to increase by 3.9 dBA from the existing AM peak noise level (65.2 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 68.0 dBA, which is a difference of 6.5 dBA from the existing PM peak noise level (61.5 dBA).

Site No. 2A

Site No. 2A is a residence located at 49 Winding Brook Road in Bordentown Township (M.P. 54.3 northbound). Although the modeled No-Build noise level in the AM peak period (60.2 dBA) is shown in Table 4.98 to decrease by 3.3 dBA from the existing AM peak noise level (63.5 dBA), this result is likely to be attributed to the fact that the Turnpike traffic is not the dominant noise source at this location. Noise from other sources such as local roadways and human activities around the measurement location may have contributed to the increased noise levels during the field measurement. The same is true for the future No-Build PM peak traffic noise level, which is shown to decrease by 4.9 dBA to 59.4 dBA from the existing PM peak noise level (64.3 dBA).

Site No. 3

Site No. 3 is a residence located at 200 Bordentown-Crosswicks Road in Chesterfield Township (M.P. 55.2 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (76.3 dBA) is predicted to increase by 3.7 dBA from the existing AM peak noise level (72.6 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 75.3 dBA, which is a difference of 1.8 dBA from the existing PM peak noise level (73.5 dBA).

Site No. 4

Site No. 4 is a residence located at 41 Shanahan Lane in Chesterfield Township (M.P. 55.7 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (73.3 dBA) is essentially the same as the existing AM peak noise level (73.4 dBA). Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 72.2 dBA, which is a difference of 1.5 dBA from the existing PM peak noise level (70.7 dBA).

Site No. 5

Site No. 5 is a residence located at 4827 Crosswicks-Hamilton Square Road in Hamilton Township (M.P. 57.4 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (69.1 dBA) is predicted to increase by 4.4 dBA from the existing AM peak noise level (64.7 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 67.3 dBA, which is a difference of 2.6 dBA from the existing PM peak noise level (64.7 dBA).

Site No. 6

Site No. 6 is a residence located at 38 Alessio Terrace in Hamilton Township (M.P. 57.5 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (65.8 dBA) is predicted to increase by 9.2 dBA from the existing AM peak noise level (56.6 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 64.1 dBA, which is a difference of 6.8 dBA from the existing PM peak noise level (57.3 dBA).

Site No. 7

Site No. 7 is a residence located at 4654 Crosswicks-Hamilton Square Road in Hamilton Township (M.P. 57.6 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (73.7 dBA) is predicted to increase by 1.5 dBA from the existing AM peak noise level (72.2 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 72.7 dBA, which is a difference of 2.6 dBA from the existing PM peak noise level (70.1 dBA).

4.19.3.3 Interchange 7A to Interchange 8

Site No. 8

Site No. 8 is a residence located at 19 Hickory Way in Washington Township (M.P. 60.8 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (71.2 dBA) is predicted to increase by 4.8 dBA from the existing AM peak noise level (66.4 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 70.2 dBA, which is a difference of 3.8 dBA from the existing PM peak noise level (66.4 dBA).

Site No. 9

Site No. 9 is a residence located at the end of Cottage Place Drive in Washington Township (M.P. 61.0 southbound). As indicated in Table 4.98, the modeled No-Build noise levels in the AM peak period (59.3 dBA) is predicted to increase by 2.3 dBA from the existing AM peak noise level (57.0 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 58.5 dBA, which is a difference of 2.0 dBA from the existing PM peak noise level (56.5 dBA).

Site No. 10

Site No. 10 is a residence located at 1 Patriot Drive in Washington Township (M.P. 61.8 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (65.6 dBA) is

predicted to increase by 8.4 dBA from the existing AM peak noise level (57.2 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 64.6 dBA, which is a difference of 6.5 dBA from the existing PM peak noise level (58.1 dBA).

Site No. 11

Site No. 11 is a residence located at 301 Sharon Road in Washington Township (M.P. 63.1 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (65.6 dBA) is predicted to increase by 1.5 dBA from the existing AM peak noise level (64.1 dBA) due to the projected increase in traffic volumes on the Turnpike. Although the future No-Build PM peak traffic noise level (64.8 dBA) is predicted to decrease by 2.9 dBA from the existing PM peak noise level (67.7 dBA) based on the modeling performed, this result is likely to be attributed to the fact that the Turnpike traffic is not the dominant noise source at this location. Noise from other sources such as local roadways and human activities around the measurement location may have contributed to the increased noise levels during the field measurement.

Site No. 12

Site No. 12 is a residence located at 24 Allens Road in Washington Township (M.P. 63.8 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (67.6 dBA) is predicted to increase by 0.8 dBA from the existing AM peak noise level (66.8 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 66.9 dBA, which is a difference of 0.9 dBA from the existing PM peak noise level (66.0 dBA).

Site No. 13

Site No. 13 is a residence located at 892 Old York Road in East Windsor Township (M.P. 65.5 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (77.4 dBA) is predicted to increase by 0.6 dBA from the existing AM peak noise level (76.8 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 76.7 dBA, which is a difference of 0.4 dBA from the existing PM peak noise level (76.3 dBA).

Site No. 14

Site No. 14 is a residence located at 49 Meadow Lakes in East Windsor Township (M.P. 67.0 southbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (59.9 dBA) is predicted to increase by 0.2 dBA from the existing AM peak noise level (59.7 dBA) due to the projected increase in congestion on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 59.4 dBA, which is a difference of 0.8 dBA from the existing PM peak noise level (58.6 dBA).

Site No. 15

Site No. 15 is a residence located at 254 Etra Road in East Windsor Township (M.P. 67.0 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (75.9 dBA) is predicted to increase by 6.3 dBA from the existing AM peak noise level (69.6 dBA) due to the projected increase in traffic volumes on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 75.0 dBA, which is a difference of 6.0 dBA from the existing PM peak noise level (69.0 dBA).

4.19.3.4 Interchange 8 to Interchange 8A

Site No. 16

Site No. 16 is a residence located at 14 Hightstown-Cranbury Station Road in Cranbury Township (M.P. 70.0 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (76.3 dBA) is predicted to increase by 0.5 dBA from the existing AM peak noise level (75.8 dBA) due to the projected increase in congestion on the Turnpike. Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 75.2 dBA, which is a difference of 0.1 dBA from the existing PM peak noise level (75.1 dBA).

Site No. 17

Site No. 17 is a residence located at 36 Daniel Street in East Windsor Township (M.P. 67.7 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (50.8 dBA) is predicted to decrease by 5.6 dBA from the existing AM peak noise level (56.4 dBA). Under the future No-Build condition, the PM peak traffic noise level is predicted to decrease to 49.8 dBA, which is a difference of 7.7 dBA from the existing PM peak noise level (57.5 dBA). However, these results are likely to be attributed to the fact that the Turnpike traffic is not the dominant noise source at this location. Noise from other sources such as local roadways and human activities around the measurement location may have contributed to the increased noise levels during the field measurement.

Site No. 18

Site No. 18 is a residence located at 63 Woodside Avenue in East Windsor Township (M.P. 67.7 northbound). As indicated in Table 4.98, the modeled No-Build noise level in the AM peak period (59.9 dBA) is predicted to increase by 3.2 dBA from the existing AM peak noise level (56.7 dBA). Under the future No-Build condition, the PM peak traffic noise level is predicted to increase to 58.8 dBA, which is a difference of 1.1 dBA from the existing PM peak noise level (57.7 dBA).

4.19.3.5 Interchange 8A to Interchange 9

As discussed in Section 3.20.3.3, the existing noise levels at the three currently unprotected residential developments within this portion of the Project Corridor was based on an earlier internal study conducted for the Turnpike Authority. That study did not include an assessment of No-Build conditions, and no modeling for the No-Build condition was conducted for any of the three sites as part of this current study.

4.19.4 Proposed Project Impacts

4.19.4.1 Construction Impacts

Short-term and temporary increases in noise levels will occur during construction. Noise levels due to construction, although temporary, may impact areas in the Project Corridor. The extent of the construction-associated noise impact depends on the nature of the project segment, the construction schedule and noise characteristics of the construction equipment. These impacts are not expected to be significant except at areas where sensitive residential receptors are located in close proximity to the Turnpike. In locations where noise barriers already exist, the construction-related noise impact will be less noticeable than in those areas where noise barriers do not exist, unless the existing barriers will have to be demolished first in order to allow the construction to proceed.

Standard specifications to be considered for inclusion in the Proposed Project's construction documents may include the following:

- All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.
- Air compressors shall meet current USEPA noise emission exhaust standards.
- Air powered equipment shall be fitted with pneumatic exhaust silencers.
- Stationary equipment powered by an internal combustion engine shall not be operated within 150 feet of noise sensitive areas without portable noise barriers placed between the equipment and noise sensitive sites. Noise sensitive sites shall include: residential buildings, motels, hotels, schools, churches, hospitals, nursing homes, libraries and public recreation areas. Portable noise barriers shall be constructed of plywood or tongue and groove boards with a noise absorbent treatment on the interior surface (facing the equipment).
- Powered construction equipment shall not be operated before 8:00 AM or after 8:00 PM within 150 feet of a noise sensitive site.

4.19.4.2 Operational Impacts

Under future Build conditions, the Turnpike will operate with dualized inner and outer roadways in each travel direction (12 total lanes). This configuration, according to the *Draft Traffic Analysis Report*, will provide for adequate operation of traffic in the year 2032. Future Build noise levels at neighborhoods containing five or more residences within the Project Corridor were predicted using the TNM model. The resulting traffic noise levels, as presented in Table 4.99, will exceed the 66 dBA threshold used in the Authority's current noise barrier policy for identifying noise impacts at several of the neighborhoods modeled. These results are discussed below.

A comparison of the AM and PM peak period modeled noise levels for both No-Build and Build conditions revealed consistently higher noise levels predicted during the AM peak period over the PM peak period. Therefore, the modeled results for the AM peak period were used to conduct the barrier analysis in the Build Year 2032.

In locations along the Project Corridor where noise barriers currently exist, modeling was not performed since the noise levels behind the barriers in those areas are not representative of highway-related noise. If the existing noise barriers are to be removed as part of the Proposed Project, they will be rebuilt at least to their original dimensions.

Sensitive communities without noise barriers that are located between Interchanges 8A and 9 have been analyzed in a previous internal study conducted for the Authority. The noise barrier analysis for those neighborhoods was conducted with previously-calculated traffic data for the No-Build and Build year of 2025. These communities are known as the Fairways at Forsgate, the Greens at Forsgate and the Pulte Homes Development.

Interchange 6 to Interchange 7

Site No. 1

The neighborhood represented by Site No. 1 consists of 10 single-family residences, including proposed residences. As shown in Table 4.99, the Build noise level at this representative receptor (59.7

Table 4.99
Existing and Future Noise Levels at Monitored Receptor Sites
2032 Build Alternative-AM Peak Period

Interchange	Site	2006 Existing Leq	2032 Build Leq	dBA Difference
6 to 7	**1**	55.4	59.7	4.3
7 to 7A	**2**	65.2	69.0	3.8
	2A	63.5	62.5	-1.0
	3	72.6	77.8	5.2
	4	73.4	74.2	0.8
	5	64.7	69.3	4.6
	6	56.6	62.7	6.1
	7	72.2	N/A*	N/A*
7A to 8	**8**	66.4	73.0	6.6
	9	57.0	63.6	6.6
	10	57.2	67.6	10.4
	11	64.1	66.6	2.5
	12	66.8	68.4	1.6
	13	76.8	81.0	4.2
	14	59.7	70.6	10.9
	15	69.6	78.6	9.0
8 to 8A	**16**	75.8	N/A*	N/A*
	17	56.4	64.8	8.4
	18	56.7	61.9	5.2
	Max	76.8	81.0	10.9
	Min	55.4	59.7	-1.0

*Indicates that the monitored receptor is proposed to be acquired as part of the Proposed Project and, therefore, could not be modeled in the Build condition.
Source: The Louis Berger Group, Inc., June 2006.

dBA) is predicted to increase by approximately 4.3 dBA from the existing measured AM peak noise level (55.4 dBA). Build noise levels in this neighborhood are predicted to range between 55.4 dBA and 61.9 dBA, depending on their specific locations. Since the Build noise levels in this neighborhood are not predicted to exceed the 66 dBA impact threshold or the 10 dBA increase criterion, noise barriers are not being considered for this location.

Interchange 7 to Interchange 7A

Site No. 2

The neighborhood represented by Site No. 2 consists of 46 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (69.0 dBA) is predicted to increase by approximately 3.8 dBA from the existing measured AM peak noise level (65.2 dBA). Build noise levels in this neighborhood are predicted to range between 61.1 dBA and 69.6 dBA, depending on their specific locations. The Build noise levels at 15 residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 2A

The neighborhood represented by Site No. 2A consists of 21 single-family residences. Although the modeled Build noise level at this representative receptor in the AM peak period (62.5 dBA) is shown in Table 4.99 to decrease by 1.0 dBA from the existing AM peak noise level (63.5 dBA), this result is likely to be attributed to the fact that the Turnpike traffic is not the dominant noise source at this location. Noise from other sources such as local roadways and human activities around the measurement location may have contributed to the increased noise levels during the field measurement. Build noise levels in this neighborhood are predicted to range between 59.1 dBA and 62.5 dBA, depending on their specific locations. Since Build noise levels in this neighborhood are not predicted to exceed the 66 dBA impact threshold or the 10 dBA increase criterion, noise barriers are not being considered for this location.

Site No. 3

The neighborhood represented by Site No. 3 consists of six single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (77.8 dBA) is predicted to increase by approximately 5.2 dBA from the existing measured AM peak noise level (72.6 dBA). Build noise levels in this neighborhood are predicted to range between 74.5 dBA and 77.8 dBA, depending on their specific locations. The Build noise levels at six residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 4

The neighborhood represented by Site No. 4 consists of seven single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (74.2 dBA) is predicted to increase by approximately 0.8 dBA from the existing measured AM peak noise level at this site (73.4 dBA). Build noise levels in this neighborhood are predicted to range between 68.5 dBA and 74.2 dBA, depending on their specific locations. The Build noise levels at all seven residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 5

The neighborhood represented by Site No. 5 consists of five single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (69.3 dBA) is predicted to increase by approximately 4.6 dBA from the existing measured AM peak noise level at this site (64.7 dBA). Build noise levels in this neighborhood are predicted to range between 62.2 dBA and 69.3 dBA, depending on their specific locations. The Build noise levels at two residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site Nos. 6 and 7

The neighborhoods represented by Site No. 6 and Site No. 7 are adjacent neighborhoods that were treated as one continuous area for impact analysis. The combination of these two neighborhoods represents a total of 16 single-family residences. Two additional homes, including monitored Site No. 7, also exist in this area, but they are proposed to be acquired as part of the Proposed Project and were not counted as part of the representative total. As shown in Table 4.99, the noise level at Site No. 6 (62.7 dBA) is predicted to increase by approximately 6.1 dBA from the existing measured AM peak noise level (56.6 dBA). Build noise levels within both neighborhoods are predicted to range between 57.4 and 72.1 dBA, depending on their specific locations. The Build noise levels at three residences within these combined neighborhoods are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Interchange 7A to Interchange 8

Site No. 8

The neighborhood represented by Site No. 8 consists of 36 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (73.0 dBA) is predicted to increase by approximately 6.6 dBA from the existing measured AM peak noise level (66.4 dBA). Build noise levels in this neighborhood are predicted to range between 60.5 dBA and 73.0 dBA. The Build noise levels at 22 residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 9

The neighborhood represented by Site No. 9 consists of 15 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (63.6 dBA) is predicted to increase by approximately 6.6 dBA from the existing measured noise level (57.0 dBA). Build noise levels in this neighborhood are predicted to range between 58.5 dBA and 63.6 dBA, depending on their specific locations. Since Build noise levels in this neighborhood are not predicted to exceed the 66 dBA impact threshold or the 10 dBA increase criterion, noise barriers are not being considered for this location.

Site No. 10

The neighborhood represented by Site No. 10 consists of 25 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (67.6 dBA) is predicted to increase by approximately 10.4 dBA from the existing measured AM peak noise level (57.2 dBA). Build noise levels in this neighborhood are predicted to range between 61.9 dBA and 67.6 dBA, depending on their specific locations. The Build noise levels at three residences are predicted to exceed the 66 dBA impact threshold and some residences are predicted to exceed the 10 dBA noise increase criterion, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 11

The neighborhood represented by Site No. 11 consists of six single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (66.6 dBA) is predicted to increase by approximately 2.5 dBA from the existing measured AM peak noise level (64.1 dBA). Build noise levels in this neighborhood are predicted to range between 62.9 dBA and 66.6 dBA, depending on their specific locations. The Build noise level at one residence is predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 12

The neighborhood represented by Site No. 12 consists of 10 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (68.4 dBA) is predicted to increase by 1.6 dBA from the existing measured AM peak noise level (66.8 dBA). Build noise levels in this neighborhood are predicted to range between 61.2 dBA and 70.3 dBA, depending on their specific locations. The Build noise levels at four residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 13

The neighborhood represented by Site No. 13 consists of 32 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (81.0 dBA) is predicted to increase by

4.2 dBA from the existing measured AM peak noise level (76.8 dBA). Build noise levels in this neighborhood are predicted to range between 61.7 dBA and 81.0 dBA, depending on their specific locations. The Build noise levels at nine receptors are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 14

The neighborhood represented by Site No. 14 is a senior citizens community with 132 individual ground floor apartment units in 22 buildings. As shown in Table 4.99, the Build noise level at the representative receptor (70.6 dBA) is predicted to increase by approximately 10.9 dBA from the existing measured AM peak noise level (59.7 dBA). Build noise levels in this neighborhood are predicted to range between 55.9 dBA and 70.6 dBA, depending on their specific locations. The Build noise levels at 24 residences are predicted to exceed the 66 dBA impact threshold and some residences are predicted to exceed the 10 dBA noise increase criterion, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 15

The neighborhood represented by Site No. 15 consists of 10 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (78.6 dBA) is predicted to increase by approximately 9.0 dBA from the existing measured AM peak noise level (69.6 dBA). Build noise levels in this neighborhood are predicted to range between 67.1 dBA and 78.6 dBA, depending on their specific locations. The Build noise levels at 10 residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Interchange 8 to Interchange 8A

Site No. 16

The neighborhood represented by Site No. 16 consists of 10 single-family residences. Two additional homes, including monitored Site No. 16, also exist in this area, but they are proposed to be acquired as part of the Proposed Project and were not counted as part of the representative total. Build noise levels within this neighborhood are predicted to range between 62.3 dBA and 73.6 dBA, depending on their specific locations. The Build noise levels at three residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 17

The neighborhood represented by Site No. 17 consists of 11 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (64.8 dBA) is predicted to increase by approximately 8.4 dBA from the existing measured AM peak noise level at this site (56.4 dBA). Build noise levels in this neighborhood are predicted to range between 57.0 dBA and 68.5 dBA. The Build noise level at one residence is predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site No. 18

The neighborhood represented by Site No. 18 consists of a total of 46 single-family residences. As shown in Table 4.99, the Build noise level at this representative receptor (61.9 dBA) is predicted to increase by approximately 5.2 dBA from the existing measured AM peak noise level at this site (56.7 dBA). Build noise levels in this neighborhood are predicted to range between 58.3 dBA and 69.0 dBA, depending on their specific locations. The Build noise levels at four residences are predicted to exceed

the 66 dBA impact threshold; however, these impacts are associated with a break in the existing barrier wall along the Turnpike.

Interchange 8A to Interchange 9

Sites P1 and P2

The Fairways at Forsgate (Site P1) and The Greens at Forsgate (Site P2) developments are located close to each other and were therefore treated as one continuous area for impact analysis. A total of at least 80 single-and multi-family residences were identified in these combined developments. Build noise levels in these neighborhoods are predicted to range between 63.0 and 71.0 dBA, depending on their specific locations. The Build noise levels at 49 residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

Site P3

In the Pulte Homes development (Site P3), a total of 51 single-family residences were identified. Build noise levels in this neighborhood are predicted to range between 64.0 and 75.0 dBA, depending on their specific locations. The Build noise levels at 40 residences are predicted to exceed the 66 dBA impact threshold, thereby making this neighborhood eligible for noise barrier consideration.

4.19.5 Mitigation of Impacts

Mitigation of noise levels may occur at the noise source, along the path of the noise, or at receiver locations. Mitigation of noise occurs in nature to varying degrees as sound propagates from the source over terrain surfaces (scattering and ground attenuation), as the distance between the source and receiver increases (dispersion), and when intervening natural terrain features intersect the path of the noise source to the receiver (diffraction).

The most common type of designed mitigation is the construction of physical barriers, typically in the form of noise barriers between the roadway (noise source) and the receiver locations (residences). Noise barriers were considered for neighborhoods having at least five or more residences, and which are predicted to experience future Build noise levels at or above 66 dBA and/or noise level increases of 10 or more dBA from the existing year of study. For a noise barrier to work, it must be high enough and long enough to block the view of a road. A noise barrier would not be effective for homes on a hillside overlooking a road or for buildings that rise above the barrier. A noise barrier can achieve a 5 dBA noise level reduction when it is tall enough to break the line-of-sight from the highway to the receiver. Openings in noise walls for driveway connections or intersecting streets destroy the effectiveness of barriers. The proposed noise barriers must be located within the Turnpike right-of-way and may only be constructed to heights between 8 and 20 feet. Due to topographic variations and the way noise diffracts over a barrier, noise levels closest to the Turnpike are abated more easily than noise levels further away.

The goal of the mitigation analysis was to provide a noise level reduction of 10 dBA, with a minimum required reduction level of 5 dBA for the homes closest to the Turnpike. In many cases, noise levels can be reduced to below the 66 dBA impact criterion; however, in order to achieve the minimum reduction level, the height and length of the barriers may need to be designed in a manner that will mitigate noise levels to a level further below 66 dBA. The goal is to reduce noise levels to below 66 dBA, but also recognizes that noise barriers must be a cost-effective measure.

Table 4.100 summarizes the predicted impacts within each neighborhood studied along with the effectiveness, dimensions, and cost (estimated at $40 per square foot) of the noise barriers selected for

Table 4.100
Future Build Noise Levels with and Without Noise Barriers
New Jersey Turnpike Interchange 6-9 Widening

Inter-change	Noise Sensitive Site Community Represented	Receptor Type	Number of Receptors Represented	Number of Impacts without Abatement (66+ dBA)	Barrier				Number of Impacted Units to Receive Benefit	Number of Non-Impacted Units to Receive Benefit	Leq Levels (dBA)		
					Length (ft)	Height (ft)	Total Cost	Cost per Unit			Existing	Build without Abatement	Build with Abatement
6 to 7	1	Residential	10	0	N/A	N/A	N/A	N/A	N/A	N/A	55.4	55.4-61.9	N/A
7 to 7A	2	Residential	46	15	2,767	12	$1,328,160	$43,546	15	31	65.2	61.1-69.6	55.4-64.5
	2A	Residential	21	0	N/A	N/A	N/A	N/A	N/A	N/A	63.5	59.1-62.2	N/A
	3	Residential	6	6	1,614	16	$1,032,960	$172,160	6	0	72.6	74.5-77.8	63.6-65.5
	4	Residential	7	7	2,002	12	$960,960	$137,280	7	0	73.4	68.5-77.8	60.9-65.6
	5	Residential	5	2	1,836	12	$881,280	$251,794	2	3	64.7	62.2-69.3	58.1-63.9
	6	Residential	16	3	1,800	16	$1,152,000	$144,000	3	10	56.6	57.4-72.1	54.3-65.2
	7										72.2		
7A to 8	8	Residential	36	22	1,417	12	$680,160	$42,510	16	0	66.4	60.5-73.3	58.8-69.2
	9	Residential	15	0	N/A	N/A	N/A	N/A	N/A	N/A	57.0	58.5-63.0	N/A
	10	Residential	25	3	2,154	8	$689,280	$49,234	3	22	57.2	61.9-67.7	58.0-63.2
	11	Residential	6	1	1,808	12	$867,840	$247,954	1	5	64.1	62.9-66.3	58.6-61.2
	12	Residential	10	4	2,500	12	$1,200,000	$171,429	4	6	66.8	61.2-70.3	56.4-63.1
	13	Residential	32	9	1,902	12	$912,960	$44,535	9	23	76.8	61.7-79.9	57.8-71.6
	14	Senior Community	132	24	3,153	14	$1,765,680	$28,027	24	90	59.7	55.9-70.6	54.2-62.8
	15	Residential	10	10	1,108	12	$531,840	$53,184	10	0	69.6	67.1-77.6	63.4-71.0
8 to 8A	16	Residential	10	3	990	14	$554,400	$184,800	3	0	75.8	62.3-73.6	61.9-66.8
	17	Residential	11	1	3,464	14	$1,939,840	$323,307	1	10	56.4	57.0-68.5	53.5-58.8
	18*	Residential	46	4	N/A	N/A	N/A	N/A	N/A	N/A	56.7	58.3-69.0	N/A
8A to 9	P1&P2 - Forsgate**	Residential	80	49	4,899	12	$2,351,520	$36,177	49	31	63.0-65.0	63.0-71.0	56.0-63.0
	P3 - Pulte**	Residential	51	40	1,203	20	$962,400	$20,922	40	11	68.0	64.0-75.0	57.0-68.0

Source: The Louis Berger Group, Inc., 2006.
Shading indicates those neighborhoods where a barrier is recommended.
* Neighborhood has an existing noise wall and will not be extended in the Build year.
** Neighborhood was part of a previous Noise study for the Turnpike widening.
N/A - Not Applicable, since these locations do not meet the basic eligibility requirements of noise impact.

each neighborhood. Barrier heights recommended in this analysis are based upon preliminary design plans, although it is noted that some variations may be appropriate during the final design phase. Figures 4-16a through 4-16f show the locations of the recommended noise barriers.

4.19.5.1 Interchange 6 to Interchange 7

Site No. 1

Since the Build noise levels in the neighborhood represented by Site No. 1 are not predicted to exceed the 66 dBA impact threshold or the 10 dBA increase criterion used by the Authority in its current noise barrier policy, this neighborhood is not eligible for noise barrier consideration.

4.19.5.2 Interchange 7 to Interchange 7A

Site No. 2

Approximately 15 residences within the neighborhood represented by Site No. 2 will be impacted by the Proposed Project. To effectively mitigate these impacts, a barrier 12 feet in height and 2,767 feet in length would be appropriate. A noise barrier of these dimensions would have a total cost of $1,328,160 and a unit cost of $43,546. The proposed barrier will overlap with the existing noise wall (15 feet in height) protecting the neighborhood to the north, as well as the existing noise wall (20 feet in height) protecting the neighborhood to the south. The homes in this neighborhood are located at a lower elevation than the Turnpike, and the proposed barrier would provide enough mitigation for all 15 impacted homes to reduce overall noise levels from between 61.1 dBA and 69.6 dBA to between 55.4 dBA and 64.5 dBA. Therefore, this proposed barrier is both feasible and reasonable and recommended for further consideration in the final design stage of analysis.

Site No. 2A

The neighborhood represented by Site No. 2A is located 1,000 feet from the Turnpike mainline and beyond, thus resulting in Build year noise levels within this neighborhood that will range from 59.1 dBA to 62.5 dBA. Since the Build noise levels in this neighborhood are not predicted to exceed the 66 dBA impact threshold or the 10 dBA increase criterion used by the Authority in its current noise barrier policy, this neighborhood is not eligible for noise barrier consideration.

Site No. 3

All six homes in the neighborhood represented by Site No. 3 are predicted to be impacted in the Build year because of their close proximity and line of sight to the Turnpike mainline. A 16-foot barrier along this segment of the Turnpike, starting north of Bordentown-Chesterfield Road and extending 1,614 feet along the edge of pavement, would provide at least a 10 dBA reduction for all impacted homes. Noise levels within this neighborhood would decrease from between 74.5 dBA and 77.8 dBA to between 63.6 dBA and 65.5 dBA. Although the selected barrier would provide a substantial reduction for six benefited residences, the total cost would be $1,032,960, with a cost per benefited residence of $172,160. The per-unit cost is not considered cost effective; therefore, a barrier is not recommended.

Site No. 4

The neighborhood represented by Site No. 4 is located in close proximity and in the line of sight to the Turnpike mainline. Therefore, all seven homes in the neighborhood are predicted to be impacted by

the Proposed Project. In order to achieve a substantial mitigation, a barrier of 12 feet in height and 2,002 feet in length would be required. This barrier would benefit all seven impacted homes and reduce noise levels by 7.6 to 12.0 dBA, depending on their specific locations. The total cost of this barrier would be $960,960, which is a cost of $137,280 per benefited residence. The-per unit cost is not considered cost effective; therefore, a barrier is not recommended.

Site No. 5

The neighborhood represented by Site No. 5 is predicted to experience impacts at two individual receptors. A barrier of 12 feet in height and 1,836 feet in length would benefit all homes and provide the minimum level of reduction of 4 dBA at all impacted sites to reduce the build noise levels from between 62.2 and 69.3 dBA to between 58.1 and 63.9 dBA. However, the total cost of this barrier would be $881,280, with a resulting cost per benefited residence of $251,794. The-per unit cost is not considered cost effective; therefore, a barrier is not recommended.

Site Nos. 6 and 7

Three residences in the neighborhoods represented by Site Nos. 6 and 7 are predicted to be impacted by the Proposed Project. In order to provide abatement for the impacted residences, a single continuous barrier of 16 feet in height and 1,800 feet in length would be necessary to reduce the noise levels in both neighborhoods by 2.6 to 6.9 dBA. The barrier would have a total cost of $1,152,000 and benefit approximately 13 residences, thereby yielding a cost per benefited residence of $144,000. The-per unit cost is not considered cost effective; therefore, a barrier is not recommended.

4.19.5.3 Interchange 7A to Interchange 8

Site No. 8

Approximately 22 residences in the neighborhood represented by Site No. 8 are proposed to be impacted by the Proposed Project. A barrier of 12 feet in height and 1,417 feet in length would benefit 16 of the 22 impacted receptors. Homes located parallel to Route I-195 would not receive significant reductions due to the high traffic volume along that roadway. The proposed barrier would reduce noise levels from between 60.5 and 73.3 dBA to between 58.8 and 69.2 dBA. The total cost of the barrier would be $680,160 with a cost per benefited residence of $42,510. Therefore, the barrier is considered to be both feasible and reasonable and will be further considered for this neighborhood.

Site No. 9

The neighborhood represented by Site No. 9 has a tree-zone barrier between the Turnpike and the residences. In the Build year, noise levels at this neighborhood are predicted to range from 58.5 to 63.6 dBA. Since the Build noise levels in this neighborhood are not predicted to exceed the 66 dBA impact threshold or the 10 dBA increase criterion, noise barriers are not being considered for this location.

Site No. 10

The first row of homes in the neighborhood represented by Site No. 10 is set back and is not located immediately next to the Turnpike right-of-way. Therefore, only three residences are predicted to be impacted by the Proposed Project. An 8-foot high barrier that is 2,154 feet long would benefit all three impacted residences as well as 22 of the non-impacted residences. Noise levels in the neighborhood would be reduced from between 61.9 and 67.7 dBA to between 58.0 and 63.2 dBA. The barrier would

Legend

- Matchline
- Municipal / County Boundary
- Short-term monitoring sites
- Long-term monitoring sites
- Previously monitored sites
- Existing Noise Walls
- Proposed Noise Walls

0 500 1,000 2,000 Feet

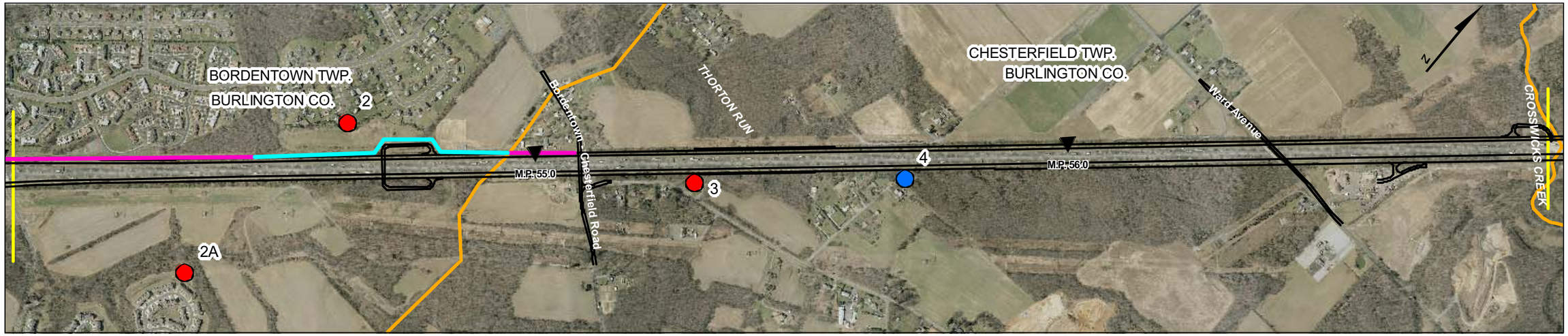
Source: Digital Orthophotos - 2006 Aerial Photography.

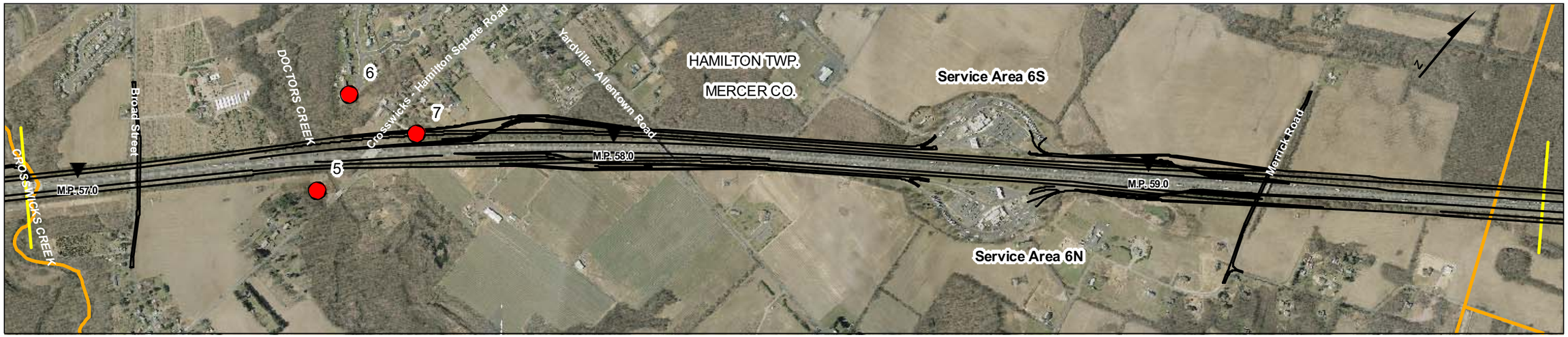
NOISE BARRIER LOCATIONS

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 4-16a





0 500 1,000 2,000 Feet

Legend

- Matchline
- Municipal / County Boundary
- Short-term monitoring sites
- Long-term monitoring sites
- Previously monitored sites
- Existing Noise Walls
- Proposed Noise Walls

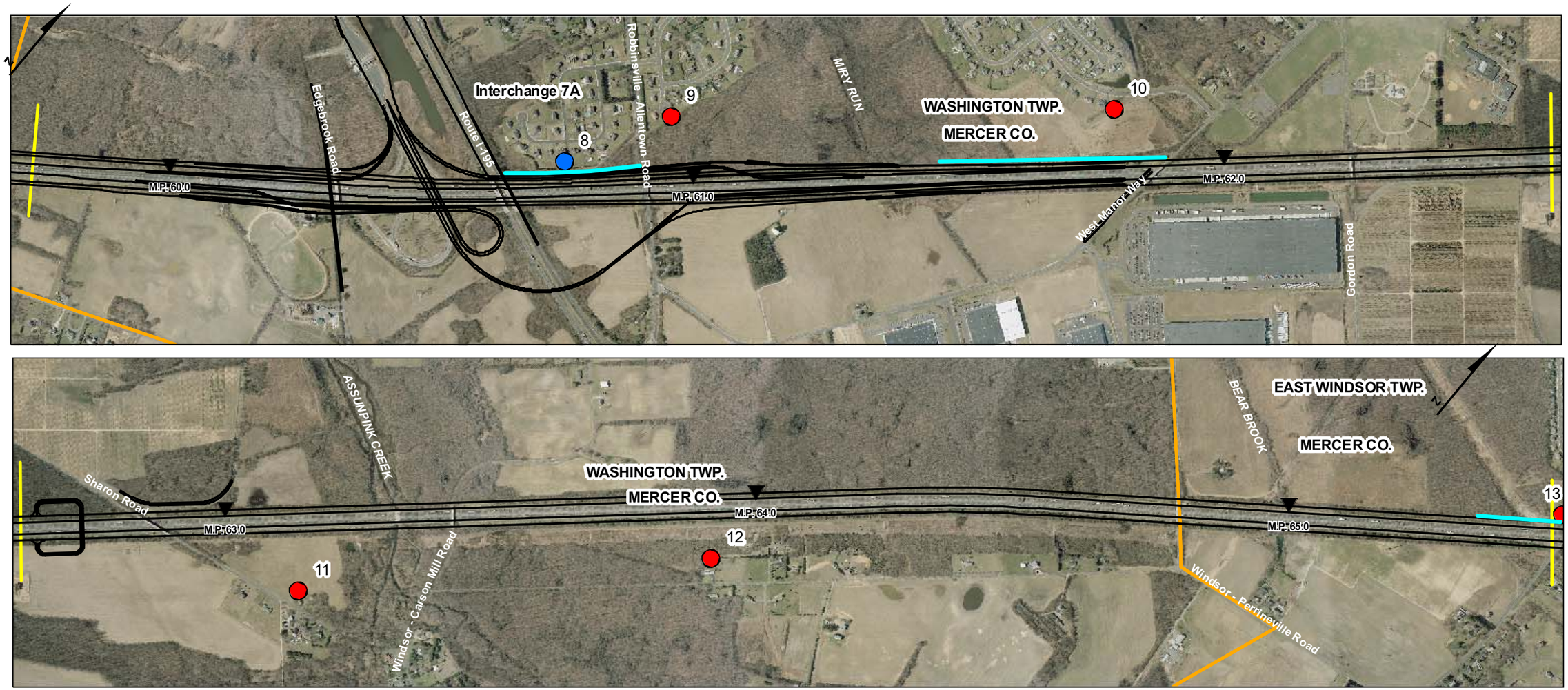
Source: Digital Orthophotos - 2006 Aerial Photography.

NOISE BARRIER LOCATIONS

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 4-16b



0 500 1,000 2,000 Feet

Legend

- Matchline
- Municipal / County Boundary
- Short-term monitoring sites
- Long-term monitoring sites
- Previously monitored sites
- Existing Noise Walls
- Proposed Noise Walls

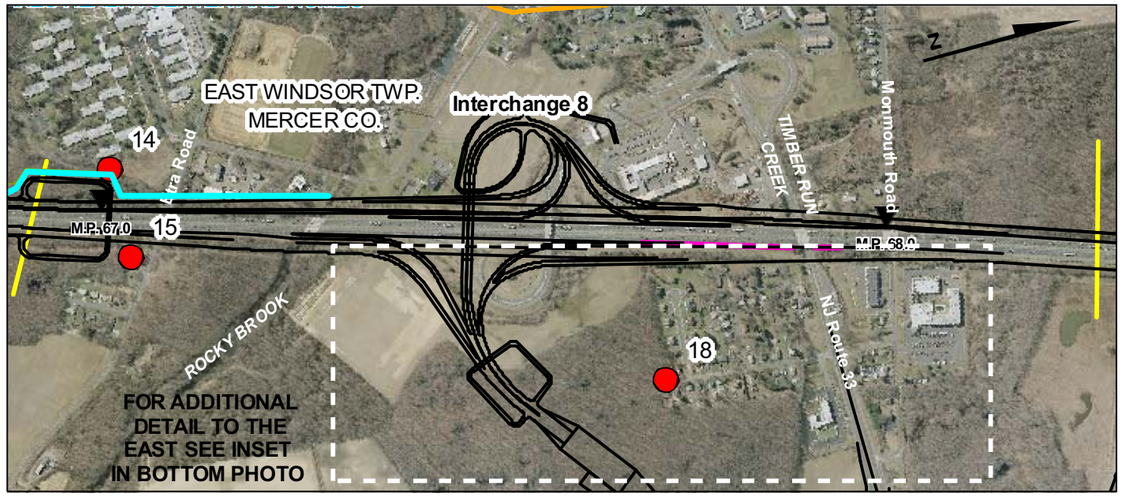
Source: Digital Orthophotos - 2006 Aerial Photography.

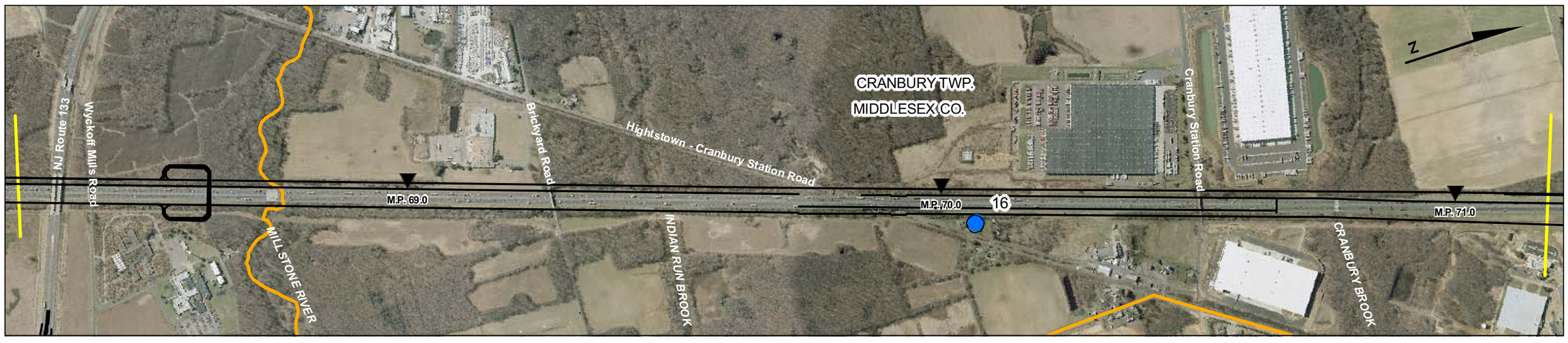
NOISE BARRIER LOCATIONS

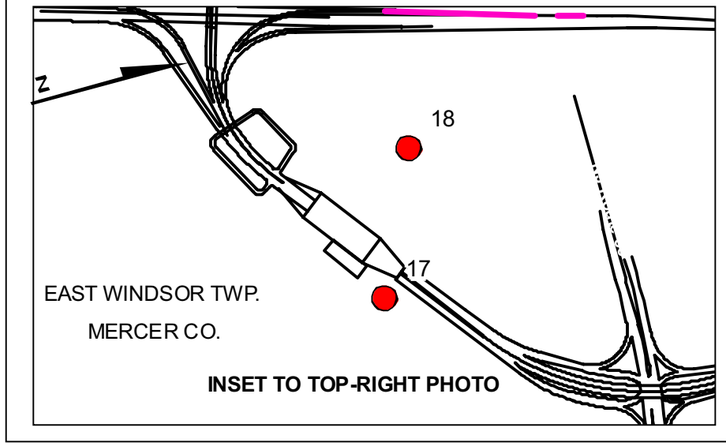
New Jersey Turnpike Interchange 6 to 9 Widening
Burlington, Mercer and Middlesex Counties
Executive Order No. 215
Environmental Impact Statement

NEW JERSEY TURNPIKE AUTHORITY
NEW JERSEY TURNPIKE

FIGURE 4-16c







Legend

- Matchline
- Municipal / County Boundary
- Short-term monitoring sites
- Long-term monitoring sites
- Previously monitored sites
- Existing Noise Walls
- Proposed Noise Walls

0 500 1,000 2,000 Feet

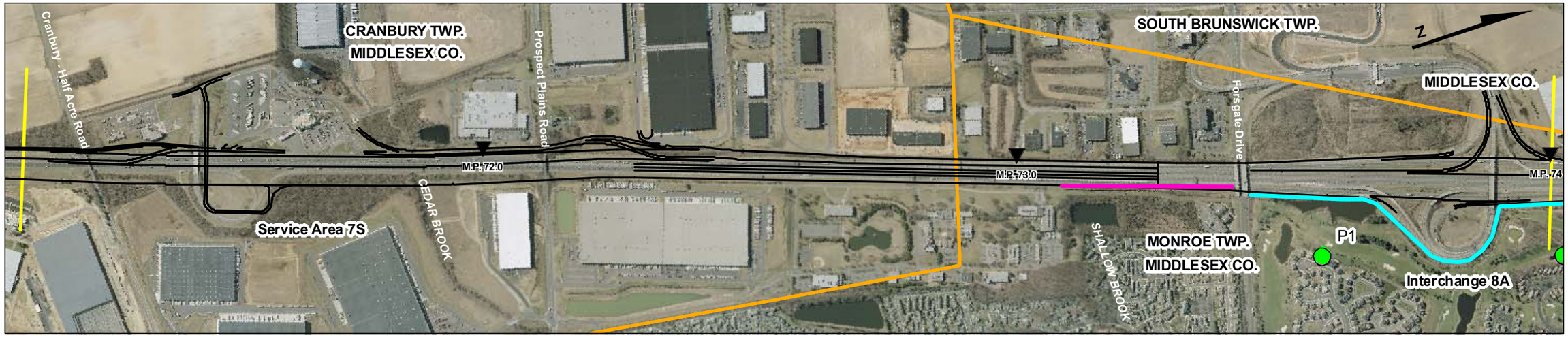
Source: Digital Orthophotos - 2006 Aerial Photography.

NOISE BARRIER LOCATIONS

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 4-16d



0 500 1,000 2,000 Feet

Legend

- Matchline
- Municipal / County Boundary
- Short-term monitoring sites
- Long-term monitoring sites
- Previously monitored sites
- Existing Noise Walls
- Proposed Noise Walls

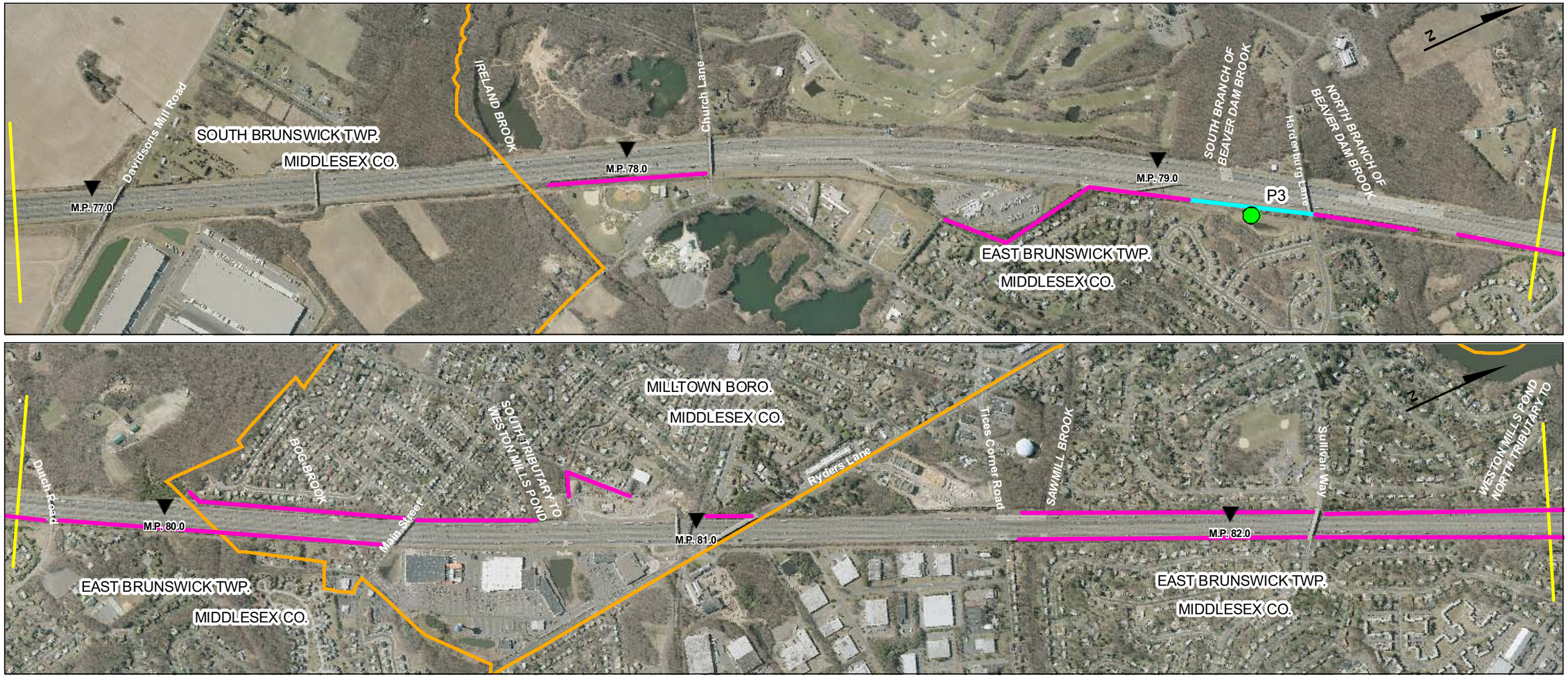
Source: Digital Orthophotos - 2006 Aerial Photography.

NOISE BARRIER LOCATIONS

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
4-16e



Legend

- Matchline
- Municipal / County Boundary
- Short-term monitoring sites
- Long-term monitoring sites
- Previously monitored sites
- Existing Noise Walls
- Proposed Noise Walls

Source: Digital Orthophotos - 2006 Aerial Photography.

0 500 1,000 2,000 Feet

NOISE BARRIER LOCATIONS

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 4-16f

have a total cost of $689,280 and a cost per benefited residence of $49,234. Therefore, the barrier is feasible and reasonable and will be further considered for this neighborhood.

Site No. 11

The neighborhood represented by Site No. 11 is set back from the Turnpike right-of-way. Therefore, only one residence is predicted to be impacted by the Proposed Project. A barrier of 12 feet in height and 1,808 feet in length would benefit the impacted residence as well as five non-impacted residences. The cost per benefited residence of $247,954 is not considered cost effective; therefore, a barrier is not recommended.

Site No. 12

The residences in the neighborhood represented by Site No. 12 are set back from the Turnpike right-of-way, and thus only four residences will be impacted by the Proposed Project. A barrier 12 feet in height and 2,500 feet in length would benefit the four impacted residences as well as six non-impacted residences and reduce noise levels by 4.8 to 7.3 dBA. The barrier would have a total cost of $1,200,000 and a cost per benefited residence of $171,429. The per-unit cost is not considered cost effective; therefore, a barrier is not recommended.

Site No. 13

The neighborhood represented by Site No. 13 is located adjacent to the Turnpike right-of-way. A total of nine residences are predicted to be impacted by the Proposed Project. A two-segment barrier with a uniform height of 12 feet and a total length of 1,902 feet would benefit all nine impacted residences and 23 non-impacted residences, thereby providing a substantial noise level reduction in the neighborhood ranging between 3.6 and 8.3 dBA. The proposed barrier would have a total cost of $912,960 and a cost benefited residence of $44,535. Therefore, the barrier is feasible and reasonable and will be further considered for this neighborhood.

Site No. 14

The senior citizens community represented by Site No. 14 is predicted to experience impacts at 24 residences. Modeled barriers from 14 to 20 feet in height meet the Turnpike's cost per benefited residence and minimum noise level reduction criteria. However, since the neighborhood is currently separated from the Turnpike by raised topography, a proposed barrier with a higher height would likely be too massive for the community and visually jarring. A barrier of 14 feet in height and 3,153 feet in length would provide sufficient mitigation for this community. The proposed barrier would benefit all 24 impacted residences and an additional 90 non-impacted residences. The recommended barrier would have a total cost of $1,765,680 and a cost per benefited residence of $28,027, and it would reduce community noise levels by 1.3 to 7.8 dBA. The barrier is feasible and reasonable and will be further considered for this neighborhood.

Site No. 15

The neighborhood represented by Site No.15 will experience 10 impacts from the Proposed Project. A 12-foot high barrier with a length of 1,108 feet would provide the minimum level of reduction required at the residences located closest to the Turnpike and benefit all 10 impacted residences. Neighborhood noise levels would be lowered by 3.6 to 6.6 dBA with the considered barrier. The total cost of the considered barrier would be $531,840, with a cost of $53,184 per benefited residence. The-per unit cost is not considered cost effective; therefore, a barrier is not recommended.

4.19.5.4 Interchange 8 to Interchange 8A

Site No. 16

Three residences in the neighborhood represented by Site No. 16 are predicted to be impacted by the Proposed Project. In order to provide a minimum reduction of 4 dBA at the sites closest to the Turnpike, a barrier of 14 feet in height and 990 feet in length was chosen for consideration. The total cost of this considered barrier would be $554,400 with a cost of $184,800 per benefited residence. The-per unit cost is not considered cost effective; therefore, a barrier is not recommended.

Site No. 17

The neighborhood represented by Site No. 17 is currently located east of the proposed relocated Interchange 8. Only one residence in this neighborhood is predicted to be impacted. A barrier of 14 feet in height and 3,464 feet in length would mitigate the impacted residence and also provide additional noise level reductions within the entire neighborhood by 3.5 to 9.7 dBA. The total cost of the barrier would be $1,939,840 with a cost per benefited residence of $323,307. The-per unit cost is not considered cost effective; therefore, a barrier is not recommended.

Site No. 18

The neighborhood represented by Site No. 18 currently has a noise wall comprised of two segments of approximately 20 feet in height that are located along the edge of pavement. The existing noise barrier provides enough noise reduction in the majority of the neighborhood. In the Build year, noise levels at this neighborhood are predicted to range from 58.3 to 69.0 dBA and to exceed the 66 dBA noise level threshold at four homes that are located in the line of sight of the unshielded section of the existing wall along the Turnpike. The proposed improvements associated with relocated Interchange 8 and its change in traffic patterns at this location would not create any new noise impacts that would exceed the Turnpike's criterion. If the existing noise wall is removed during the Proposed Project, the barrier will be rebuilt to its original dimensions plus the gap in the barrier would be constructed. However, an additional barrier at this location is not considered to be reasonable and is not recommended.

4.19.5.5 Interchange 8A to Interchange 9

Sites P1 and P2

Due to the proximity of the two Forsgate developments to each other, the construction of a single lengthy barrier is proposed to protect both of these areas. In the Build year considered for this area, noise levels at this neighborhood are predicted to range from 63 to 71 dBA and to exceed the 66 dBA threshold at 49 impacted receptors. A barrier 12 feet in height and 4,899 feet in length would provide the best mitigation in terms of costs and benefits. All 49 impacted receptors would benefit from the proposed barrier, including an additional 31 non-impacted residences. The total cost of the barrier would be $2,351,520, resulting in a cost-per-benefited residence of $36,177. The proposed barrier results in a maximum noise level reduction of 9 dBA (at two impacted receptors) and a minimum noise level reduction of 4 dBA. The average noise level reduction is 7 dBA. The barrier is feasible and reasonable and will be further considered for this location.

Site P3

The barrier heights studied at the Pulte Homes development range from 16 feet to 20 feet due to proximity of the development to the Turnpike roadway. The best value in terms of cost and benefit

would be associated with a 20-foot barrier height, which is the recommended height for this location. At a total cost of approximately $960,000, the cost-per-benefited residence is $20,922. This is also the lowest height where the mitigation goal of 10 dBA reduction is achieved at any location (one receptor only), while five other receptors achieve a 9 dBA reduction as well. The minimum noise level reduction is 6 dBA while the average noise level reduction is 7 dBA. It should be noted that the northern-most portion of the existing noise barrier to the south, which would be physically connected to the recommended barrier, also has a 20-foot height. Most of the existing barrier is actually higher than 20 feet. By constructing the new proposed barrier as an extension of the existing barrier, the 20-foot height would provide a more uniform appearance. The barrier is feasible and reasonable and will be further considered for this location.

4.19.6 Summary

Barriers will be further considered at two locations on the northbound side of the Turnpike (Forsgate and Pulte developments). The total combined length of these barriers is 6,102 feet. The heights of the barriers will be 12 and 20 feet, respectively, due to differences in roadway-receptor topography. The total estimated cost of these barriers is $3,313,920.

Barriers will be further considered at five locations on the southbound side of the Turnpike (neighborhoods represented by Site Nos. 2, 8, 10, 13 and 14). The total combined length of these barriers is 11,393 feet. The heights of the barriers will range between 8 and 14 feet due to differences in roadway-receptor topography. The total estimated cost of these barriers is $5,376,240.

As mentioned previously, barrier heights and lengths recommended in this analysis are based upon the Proposed Project's preliminary design plans. However, some variations in these heights and lengths may be appropriate during the final design phase.

The Turnpike Authority is also committed to replacing any existing noise barriers that may be removed due to the Proposed Project to at least match their existing dimensions. The actual heights and lengths of these barriers will be refined during the final design phase.